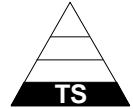


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**DOE-STD-XXXX-YR
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DOE STANDARD

GUIDE TO GOOD PRACTICE FOR ESTABLISHING AUTHORIZED LIMITS FOR THE RELEASE OF WASTE AND PROPERTY CONTAMINATED WITH RESIDUAL RADIOACTIVITY



**U.S. Department of Energy
Washington, D.C. 20585**

AREA ENVR

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**GUIDE TO GOOD PRACTICE FOR ESTABLISHING AUTHORIZED LIMITS
FOR THE RELEASE OF WASTE AND PROPERTY CONTAMINATED WITH
RESIDUAL RADIOACTIVITY**

DOE-STD-XXXX-99

PROPOSED

Project Number ENVR0012

March 1999

DOE-STD-XXXX-YR

FOREWORD

1. This Department of Energy Standard is approved for use by all DOE Components and their contractors.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data that may improve this document should be sent to the Office of Nuclear Safety Policy and Standards (EH-31) , U.S. Department of Energy, Washington, DC 20585, by letter or by using the self-addressed Document Improvement Proposal form (DOE F 1300.3) appearing at the end of this document.
3. DOE technical standards, such as this Standard, do not establish requirements. However, all or part of the provisions in a DOE Standard can become requirements under the following circumstances:
 - (1) they are explicitly stated to be requirements in a DOE requirements document; or
 - (2) the organization makes a commitment to meet a standard in a contract or in an implementation plan or program plan required by a DOE requirements document.

Throughout this Standard, the word “shall” is used to denote actions which must be performed if the objectives of this Standard are to be met. If the provisions in this Standard are made requirements through one of the two ways discussed above, then the “shall” statements would become requirements. It is not appropriate to consider that “should” statements would automatically be converted to “shall” statements as this action would violate the consensus process used to approve this Standard.

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Appendix A Pelletier, R. F., *Application of DOE 5400.5 Requirement for Release and Control of Property Containing Residual Radioactive Material*. Memorandum, U.S. Department of Energy, Washington D.C., November 17, 1995.

Appendix B Frei, M. W., *Establishment and Coordination of Authorized Limits for Release of Hazardous Waste Containing Residual Radioactive Material*, Memorandum, U.S. Department of Energy, Washington, D.C., January 1997.

Appendix C *Performance Objective for Certification of Non-Radioactive Hazardous Waste*. Office of Waste Management, Office of Environmental Management, U.S. Department of Energy, Washington, D.C., November 15, 1991 (Revision 1, February 17, 1995).

Appendix D Release of Waste from a Radioactive Materials Management Area.

DEFINITIONS

Agreement States - States that have assumed regulatory responsibility over byproduct, source, and small quantities of special nuclear materials. They have requirements that are, at least, equivalent to NRC requirements, but may be more restrictive. Therefore, any facility within the jurisdiction of an agreement state requires that the state (rather than the NRC) be contacted to determine requirements applicable for shipment to the facility.

As Low As Reasonably Achievable (ALARA) - A phrase (acronym) used to describe an approach to radiation protection to control or manage exposures (both individual and collective to the work force and the general public) and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. As used in this Order, ALARA is not a dose limit, but rather it is a process that has as its objective the attainment of dose levels as far below the applicable limits of the Order as practicable. (DOE 5400.5)

Authorized Limit - A level of residual radioactive material that shall not be exceeded if the remedial action is to be considered completed and the property is to be released without restrictions on the use due to residual radioactive material. (DOE 5400.5)

Guideline a guideline for residual radioactive material is a level of radioactive material that is acceptable for use of property without restrictions due to residual radioactive material. Guidelines for residual radioactive material presented herein are of two kinds, generic and specific. The basis for the guidelines is generally a presumed worst-case plausible-use scenario for the property. (DOE 5400.5)

Members of the Public means persons who are not occupationally associated with the DOE facility or operations, i. e., persons whose assigned occupational duties do not require them to enter the DOE site. (DOE 5400.5)

Mixed waste - A radioactive waste which is also regulated under Subtitle C of RCRA.

Note: Radioactive state-hazardous and TSCA-regulated waste are NOT technically Mixed Wastes, but are still subject to the requirements of the Performance Objective.
(Performance Objective for Certification of Non-Radioactive Hazardous Waste)

Moratorium - The moratorium on offsite shipment of hazardous waste, potentially contaminated with radioactivity, imposed May 17, 1991 by the EM Office of Waste Management (EM-30). (See Ref.# 3)

Performance Objective - Performance Objective for Certification of Non-Radioactive Hazardous Waste, requirements designed by the DOE Office of Waste Management to determine whether a RCRA-hazardous, state-hazardous, or TSCA-regulated waste is radioactive. (See Ref.# 4 & Appendix C)

Public Dose means the dose received by member(s) of the public from exposure to radiation and to radioactive material released by a DOE facility or operation, whether the exposure is within a DOE site boundary or off-site. It does not include dose received from occupational exposures, doses received from naturally occurring "background" radiation, doses received as a patient from medical practices, or doses received from consumer products. (DOE 5400.5)

Radioactivity means the property or characteristic of radioactive material to spontaneously "disintegrate" with the emission of energy in the form of radiation. The unit of radioactivity is the curie (or becquerel). (DOE 5400.5)

Radioactive Materials Management Area (RMMA) - An area in which the potential exists for contamination because of the presence of unencapsulated or unconfined radioactive material or an area that is exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation. (Performance Objective for Certification of Non-Radioactive Hazardous Waste)

Radioactive Waste - Any waste managed for its radioactive content which is not otherwise regulated for that content (e.g., regulated by Clean Air Act, etc.). If a material was received as nonradioactive, any resulting waste is not a radioactive waste if it:

- 1) Contains no measurable increase in radioactivity (at a statistically defined confidence interval) above background in volume or bulk resulting from DOE operations except for wastes specifically exempted or excepted by the EPA, DOE, or NRC regulations; and
- 2) Complies with the surface contamination requirements established in DOE Order 5400.5, II.5.c.(1). (Performance Objective for Certification of Non-Radioactive Hazardous Waste)

Release of Property - The exercise of DOE authority to relinquish control after confirming that residual radioactive material (over which DOE has authority) on the property has been determined to meet the guidelines for such material in Chapter IV of DOE 5400.5, *and any other applicable radiological requirements*.

Remedial Action - Those actions consistent with permanent remedy taken instead of, or in addition to, removal action in the event of a release [or threatened release] of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. (DOE 5400.5)

Residual Radioactive Material - Any radioactive material which is in or on soil, air, equipment, or structures as a consequence of past operations or activities. (DOE 5400.5)

Unrestricted Release - The release of property (e.g., waste), based on a formal, documented decision that the property may be utilized, treated, or disposed of by any party without concern for radioactive content. (Performance Objective for Certification of Non-Radioactive Hazardous Waste)

ABBREVIATIONS AND ACRONYMS

AEA Atomic Energy Act (of 1954, as amended)

ALARA As Low As Reasonably Achievable

ASTWMO

Association of State and Territorial Waste Management Officials

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

CRCPD Conference of Radiation Control Program Directors

DOE U.S. Department of Energy

DOT U.S. Department of Transportation

EH DOE Office of Environment, Safety and Health

EM DOE Office of Environmental Management

EPA U.S. Environmental Protection Agency

EPCRA Emergency Planning and Community Right-To-Know Act

ER Environmental Restoration

ICRP International Commission on Radiological Protection

ISCORS Interagency Steering Committee on Radiation Standards

NCRP National Council on Radiation Protection and Measurements

NRC U.S. Nuclear Regulatory Commission

PO Performance Objective for Certification of Non-Radioactive Hazardous Waste

RCRA Resource Conservation and Recovery Act

RMMA Radioactive Materials Management Area

TSCA Toxic Substances Control Act

TSD Treatment, Storage, and Disposal

WAC Waste Acceptance Criteria

WM Waste Management

WMSC Waste Management Steering Committee

**GUIDE TO GOOD PRACTICE FOR ESTABLISHING AUTHORIZED LIMITS
FOR THE RELEASE OF WASTE AND PROPERTY CONTAMINATED WITH
RESIDUAL RADIOACTIVITY**

1.0 Scope. This Standard establishes uniform Department of Energy guidance for developing, establishing, and coordinating authorized radiological limits for the release of wastes (non-real property) to landfills and/or other Treatment, Storage, or Disposal Facilities (TSDF) not licensed to receive radioactive material. At present, DOE Order 5400.5, "Radiation Protection of the Public and Environment," issued February 8, 1990, defines requirements under which DOE facilities may establish authorized radiological release limits for release of waste and property for off-site disposal.(Ref.# 1) The Order has been supplemented by guidance provided by the Office of Environment, Safety and Health (EH) and the Office of Environmental Management (EM).(Ref.# 2 & 7) The EH and EM guidance (copies provided in the Appendix) defines protocols for use by DOE Field Elements and Contractors in establishing authorized radiological release limits on a case-by-case basis; including the requirement that appropriate Field and Headquarters program and oversight organizations retain the prerogative to review and/or approve proposed authorized limits prior to implementation. The guidance defined herein integrates the EH and EM guidance, and experience gained in the application of this guidance, to produce a user-friendly Guide to Good Practice.

1.1 Purpose. The purpose of this Standard is to promulgate uniform guidance consistent with DOE policy for establishing authorized Limits for the release of waste and/or property contaminated with residual radioactivity. The guide is intended to amplify and institutionalize current guidance and experience such that hazardous and non-hazardous waste and property, contaminated with residual radioactivity, may be safely and effectively treated, stored, and/or disposed. (Note - as defined and used in this standard, the term "hazardous waste" includes RCRA-hazardous, state-hazardous, and TSCA-regulated waste.)

1.2 Applicability. This standard applies to the establishment of authorized radiological release limits for off-site release of DOE waste contaminated with residual radioactivity and is applicable to all DOE operations and projects. This guidance continues the DOE policy of controlling the release of waste; uncontrolled releases have never been authorized and are not permitted. The EH Guidance, "Application for DOE 5400.5 Requirements for Release and Control of Property Containing Residual Radioactive Material," November 17, 1995, relates to property, including sanitary (non-hazardous) waste (waste is non-real property). (See Appendix A) The EM Guidance, "Guidance on Establishment and Coordination of Authorized Limits for Release of Hazardous Waste Containing Residual Radioactive Material," January 7, 1997, relates specifically to the release of hazardous waste that may contain residual radioactivity. (See Appendix B) This Standard integrates these two basic documents with experience from successful case-by-case releases into a single guide which may be used to develop standards or criteria (authorized release limits) under which materials contaminated with residual radioactivity may be released without reducing the level of protection provided to the public, workers, and the environment achieved by current practice. Such guidance should prove efficacious because it maintains the protections required by existing policy and practice, while providing a mechanism to expedite site clean-up and restoration of DOE facilities.

2.0 Background. In the past, some DOE facilities improperly shipped waste containing slight concentrations of residual radioactive material to TSD facilities not licensed by the Nuclear Regulatory Commission (NRC) or Agreement States to handle radioactive materials (hereinafter referred to as "unlicensed facilities"). In response to these incidents, on May 17, 1991, the DOE Office of Waste Management issued a moratorium on the shipment of RCRA-hazardous, State-hazardous, and TSCA-regulated wastes originating in Radiation Control Areas to such unlicensed facilities.(Ref.# 3) DOE determined that this action was necessary to provide assurance that its contractor operations were appropriately characterizing, labeling, and handling hazardous wastes.

The hazardous waste shipping moratorium was to remain in effect at each DOE site until such time as that operation demonstrated that it was implementing management programs consistent with the EM-30 "Performance Objective for Certification of Non-Radioactive Hazardous Waste." (Ref.# 4) The Performance Objective (PO) was established "To assure that RCRA-hazardous, State-hazardous, and TSCA-regulated wastes shipped from DOE facilities to commercial treatment, storage or disposal facilities have no bulk or volume radioactive contamination added as a result of DOE Operations (*emphasis added*) and are in compliance with DOE Order 5400.5 criteria for surface contamination unless the receiving facility is specifically licensed to manage radioactive waste."

The Performance Objective established Radioactive Materials Management Areas (RMMAs) as an essential element in the management of potentially radioactive waste. The RMMA is applicable to the management of ALL WASTE (hazardous and non-hazardous) which may contain radioactive materials.

The Performance Objective also reminded DOE sites that "although the moratorium does not apply to non-hazardous [sanitary] waste, the maxims of the PO should be applied to all waste generated in a RMMA as it is DOE policy to not release any radioactive waste off-site unless the person or firm receiving the waste is licensed to receive the radioactive component." (See Appendix C, page A-10] The PO further stated, "The PO and the criteria contained therein apply to sanitary [non-hazardous] waste as well as hazardous waste, although the shipping moratorium does not. Therefore, establishment of RMMAs shall be based on the presence of unencapsulated or unconfined radioactive material or the presence of beams capable of causing activation, not on the types of operations permitted in these areas." (See Appendix C, page A-8]

The Performance Objective is to remain in effect until the Department, in cooperation with other Federal Agencies, established risk-based numerical limits for release of waste. Once established, implementation of numerical limits will be subject to individual state regulations.

3.0 Establishing Authorized Limits for the Release of Waste (non-real property)

Contaminated with Residual Radioactivity. The following guidance has been developed consistent with DOE policy for establishing authorized limits for the release of property (waste) contaminated with residual radioactivity as defined in DOE Order 5400.5 and related guidance documents. It continues the DOE policy of controlling the release of waste; uncontrolled releases are not permitted. This guidance is intended to amplify and institutionalize current policy, guidance and experience such that hazardous and non-hazardous (sanitary) waste, contaminated with residual radioactivity, may be safely and effectively treated, stored, and/or disposed. The key steps in the process for release of waste are illustrated in Appendix D, "Release of Waste from a Radioactive Materials Management Area."

3.1 Radioactive Materials Management Area (RMMA). One of the basic requirements of the EM-30 Performance Objective (PO) for Certification of Non-Radioactive Hazardous Waste is the classification of Radioactive Materials Management Areas (RMMAs) from which all hazardous (RCRA-hazardous, state-hazardous, and TSCA-regulated) waste is considered potentially radioactive. (See Appendix C) Although the moratorium does not apply to non-hazardous waste, the release criteria defined in the PO should be applied to all waste generated in a RMMA to maintain consistency with the DOE policy to not release any radioactive waste off-site unless the person or firm receiving the waste is licensed to receive the radioactive component. A RMMA is defined as:

"an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area that is exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation."

The intent of this definition is to ensure that any area in which waste could potentially become radioactive is classified as a RMMA; all waste originating, used or stored in a RMMA must be certified through process knowledge, surveying, and/or sampling and analysis that it is not contaminated before it can be released offsite. The PO defined

“contaminated” as surface contamination exceeding DOE Order 5400.5 limits, or DOE-added volume contamination that was measurable above background. Hazardous waste originating outside a RMMA can be released offsite to an appropriately permitted TSD facility based solely on its origin outside a RMMA.

Additionally, the PO and the criteria contained therein apply to sanitary (non-hazardous) waste as well as hazardous waste, although the shipping moratorium does not. (See Appendix C, pages A-8 & A-10) Therefore, establishment of RMMAs shall be based on the presence of unencapsulated or unconfined radioactive material or the presence of beams capable of causing activation, not the types of operations permitted in these areas.

The delineation of RMMAs is a complex technical process which is central to the management of waste at DOE facilities where radioactive materials are present. Operating procedures must specify the identification of the physical boundaries of areas qualifying as RMMAs. Any waste streams exiting an RMMA would be considered to be potentially contaminated. Detailed guidance is provided in Attachment A of the Performance Objective, “Guidance to Facilities on Classification of Radioactive Materials Management Areas (RMMAs).” (See Appendix C)

3.2 Release of Waste from a RMMA. Release of waste from a RMMA is controlled by the multi-step process illustrated in Appendix D. The PO requires that approved policies and procedures, as stipulated in the PO, must be effectively implemented before ANY waste (hazardous or not) may exit an RMMA. The development, approval and implementation of these required procedures includes, but is not limited to, procedures for dose assessments and ALARA analyses of the waste in question. If the approved procedures are not in place and followed, waste (hazardous or non-hazardous) may NOT be released from the RMMA. See Appendix C; Section 6.0, “Determining Radioactive Status of Wastes,” Section 7.0, “Shipment of Mixed Waste to a Licensee,” Section 8.0, “Department of Transportation Shipping Requirements,” and Section 8.0, “Quality Assurance,” for discussion of the appropriate policies and procedures that must be implemented before waste may be released from a RMMA. As noted in Section 3.1 above, the PO and the criteria

contained therein apply to sanitary (non-hazardous) waste as well as hazardous waste, although the shipping moratorium does not.

3.3 Moratorium on Shipment of Hazardous Waste. The next step in the release process requires a determination as to whether or not the waste of concern is subject to the EM moratorium on contaminated hazardous waste shipments. The moratorium was established on May 17, 1991, by EM-30 memorandum, "Shipment of Waste Originating in Radiation Control Areas" to ensure that RCRA-hazardous, State-hazardous, and TSCA-regulated wastes shipped from DOE facilities to commercial TSD facilities have NO bulk or volume radioactive contamination added as a result of DOE operations, and are in compliance with DOE 5400.5 criteria for surface contamination. The exception is that these wastes may be shipped to a TSD facility if that facility is specifically licensed to manage radioactive waste.

If the waste is NOT RCRA-hazardous, state-hazardous, or TSCA-regulated (not subject to the moratorium), it is NON-HAZARDOUS waste; and its disposition is controlled by the requirements of DOE 5400.5, the November 17, 1995 EH guidance, and the release criteria presented in the EM-30 Performance Objective. Conversely, if the waste is RCRA-hazardous, state-hazardous, or TSCA-regulated (subject to the moratorium) it is defined by the moratorium and the EM-30 Performance Objective as HAZARDOUS; and its disposition is controlled by the requirements of DOE 5400.5, the January 7, 1997 EM guidance and the EM-30 Performance Objective.

3.4 Performance Objective - Waste Release Criteria. The next step involves a determination of whether the waste (either HAZARDOUS or NON-HAZARDOUS) meets the release criteria as established in the EM PO (Rev. 1, February 17, 1995). The PO criteria apply to NON-HAZARDOUS (sanitary) waste even though the moratorium does not. The PO incorporates requirements from DOE 5400.5; thus, waste meeting the PO release criteria also meets requirements established by DOE 5400.5. PO release criteria are:

(a) no bulk or volume radioactive contamination added as a result of DOE operations, and

(b) surface contamination in compliance with criteria specified in DOE Order 5400.5.

HAZARDOUS (RCRA-hazardous, state-hazardous, and TSCA-regulated) waste determined to meet these release criteria is classified as “non-radioactive hazardous waste” and may be released to an appropriately Permitted TSD facility not licensed to receive radioactive material. Section 3.5 addresses guidance applicable to HAZARDOUS waste that fails to meet the PO release criteria.

NON-HAZARDOUS (sanitary) waste determined to meet the PO release criteria is classified as “non-radioactive non-hazardous (sanitary) waste” and may be released to an appropriate TSD facility. Section 3.6 addresses guidance applicable to NON-HAZARDOUS (sanitary) waste that fails to meet the PO release criteria.

3.5 Hazardous Waste that Fails to Meet PO Release Criteria. Criteria defined in the January 7, 1997 EM guidance apply to the HAZARDOUS waste that fails to meet the PO release criteria. Refer to the EM guidance in Appendix B for a discussion of these criteria. If the January 7, 1997 EM criteria are NOT met, the waste must be handled as MIXED WASTE. HAZARDOUS waste determined to meet the January 7, 1997 EM criteria, subject to successful completion of appropriate negotiations with regulatory authorities, states, and facility operators (as specified in the EM guidance), may be released to a Permitted TSD facility not licensed to receive radioactive material.

3.5.1 Criteria for Release of Hazardous Wastes. The guidance presented in this document is applicable to off-site release of hazardous wastes containing residual radioactive material. On-site disposal of wastes shall continue to be performed in accordance with existing requirements and guidance.

In accordance with the November 17, 1995 EH guidance DOE may establish and approve authorized limits and associated survey and protocol for release of wastes to TSD facilities not licensed to handle radioactive materials if:

1. The authorized limits are selected and approved by DOE on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and to ensure that individual doses to the public are less than 25 millirem in a year with a goal of a few millirem in a year or less.
2. The authorized limits are evaluated to ensure that ground water will be protected in a manner consistent with the objectives of the applicable State regulations and guidelines.
3. The authorized limits are assessed to ensure that release of the disposal facility property would not be expected to require remediation under DOE 5400.5 requirements or other applicable requirements for release of property containing residual radioactive material as a result of DOE disposals.
4. The authorized limits and planned releases are coordinated with and acceptable to operators implementing facility waste acceptance criteria and State representatives responsible for implementing waste regulations to ensure that DOE releases do not violate TSD facility-specific radiological protection requirements.

3.5.2 Dose Assessments and ALARA Evaluations. Dose assessments for TSD facilities should include consideration of all significant pathways of exposure for likely or reasonably expected uses of the TSD facilities after closure as well as doses to workers during operation of the TSD facilities. Potential doses to workers conducting corrective actions at the disposal site should be considered.

The assessment of potential groundwater impacts may give consideration to site-specific controls in place to maintain the long-term integrity of the disposal site if the authorized limits are developed for disposal at a specific site. However, if the authorized limits are being developed to permit disposal to a number of potential sites, the assessment should be sufficiently conservative so as not to underestimate dose.

In general, the evaluations required to meet the requirements of items 1 and 2 of Section 3.5.1 will provide reasonable assurance that the requirements of item 3 (Section 3.5.1) are also met. However, in addition to assessing doses under actual and likely use and demonstrating that these doses will be as far below 25 mrem in a year as is practicable (the goal being a few mrem or less), DOE requires that released wastes be evaluated to ensure that worst plausible doses will not exceed the 100 mrem in a year primary dose limit. To provide a reasonable expectation that this requirement will be met, the analysis should consider potential exposures to intruders of a disposal site should restrictions fail.

Other useful guidance or tools to assist facilities in developing acceptable authorized limits are provided in Section 11.2, "Bibliography of Technical Resources."

3.6 Non-hazardous Waste that Fails to Meet PO Release Criteria. Criteria described in the November 17, 1995 EH guidance apply to the NON-HAZARDOUS waste that fails to meet the PO release criteria. Refer to the EH guidance in Appendix A for a discussion of the these criteria. If the November 17, 1995 EH criteria are NOT met, the waste must be handled as RADIOACTIVE WASTE. NON-HAZARDOUS (sanitary) waste determined to meet the EH criteria, subject to the additional constraints contained in the EH guidance, may be released for disposal at a DOE operated landfill or public/offsite landfill. All DOE facilities and operations must also conform to applicable external regulatory requirements.

There are three general situations for which the DOE radiological release criteria may be used. They are:

- 1) Application of DOE-derived and -approved radiological release criteria for disposal of material and property [waste] in a DOE-operated onsite landfill.
- 2) Application of DOE-derived and -approved radiological release criteria for disposal of material and property [waste] in a public or offsite landfill.
- 3) Application of DOE-derived and -approved radiological release criteria for sale or transfer of property to members of the public.

3.6.1 Release criteria for disposal of material and property (waste) in a DOE-operated onsite landfill. The Department has the responsibility and authority to establish limits for protection of the public and environment either in the form of radionuclide release criteria or waste acceptance criteria for disposal of materials in a DOE onsite landfill. Disposal of such material must conform to the requirements of Order DOE 5400.5 (and, when promulgated, as final rule 10 CFR Part 834) and applicable portions of Order DOE 5820.2A. DOE must establish limits such that doses to the public will be as far below the dose limits in DOE 5400.5 (or 10 CFR Part 834, as appropriate) as is practicable. The criteria should be such that it is not likely that disposal of materials into the landfill will result in a future requirement for remediation of the landfill subject to Chapter IV of DOE 5400.5. To assure that these requirements and goals are achieved, authorized radiological limits for material sent to a DOE landfill (which is not an authorized low-level waste disposal facility) must be approved by DOE and should be:

- 1) Selected (and approved by DOE) on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and selected to ensure that individual doses to the public are less than 25 mrem in a year with a goal of a few millirem in a year or less.
- 2) Evaluated to ensure ground water will be protected in a manner consistent with the objectives of the site's Ground-Water Protection Program objectives (DOE 5400.1) and/or applicable Federal or State requirements.

- 3) Evaluated to verify that release of the landfill property would not be expected to require remediation under DOE 5400.5 requirements for release of property containing residual radioactive material giving due consideration to experience gained from past or on-going CERCLA or RCRA cleanup actions.

Additional discussion of the ALARA process and other factors to be considered in this application are presented in the EH guidance in Appendix A.

3.6.2 Release criteria for disposal of material and property (waste) in a public or offsite landfill. The criteria for disposal of material and property in a public or offsite landfill are similar to those established for release of property except that there is an additional consideration. Many local landfills have waste acceptance criteria or are subject to State requirements for radioactive material. In addition to meeting DOE requirements to establish authorized limits and survey, review and documentation protocols that ensure doses are as far below the primary dose limit as is practicable, authorized limits and release protocol must meet acceptance criteria and State requirements for the subject landfills. To ensure that these requirements and goals are achieved, authorized limits for material sent to a non-DOE landfill (which is not an authorized low-level waste disposal facility) should be:

- 1) Selected (and approved by DOE) on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and to ensure that individual doses to the public are less than 25 mrem in a year with a goal of a few millirem in a year or less.
- 2) Evaluated to ensure that ground water will be protected in a manner consistent with the objectives of the applicable State regulations and guidelines
- 3) Assessed to ensure that release of the landfill property would not be expected to require remediation under DOE 5400.5 or other applicable requirements for release of property containing residual radioactive material as a result of DOE disposals.

- 4) Coordinated with and acceptable to the landfill operator implementing the acceptance criteria and State representatives responsible for implementing solid waste regulations to ensure that DOE releases do not violate landfill-specific radiological protection requirements.

3.6.3 Release criteria for sale or transfer of property to members of the public. Authorized limits may be developed for situations where the Department transfers ownership (either by sale or other means) to members of the public or releases personal property from DOE radiological control. Although DOE and DOE contractors are exempt from 10 CFR Part 61 and 10 CFR Part 20, individuals receiving the subject material are not. The Department will not transfer licensable materials to members of the public who are not licensed to receive them. Therefore, as part of the process for developing authorized limits for residual radioactive material and the associated survey and review protocol to ensure that released material and property are acceptable for public use, the Department must ensure that such property and material do not contain licensable amounts or concentrations of radionuclides. The following criteria should be implemented to comply with DOE 5400.5 residual radioactive material requirements:

- 1) Authorized limits for property must ensure that doses to the public from all sources are less than the primary dose limit for all sources (100 mrem in a year).
- 2) Authorized limits for the property must be developed and approved by DOE consistent with the ALARA process. Appropriate protocols for survey and review of the release of such property must accompany the request for approval of the authorized limits; these protocols form an essential part of the approval documentation package. These limits shall be based on a documented finding that they are as low as practicable as determined through the ALARA process with a goal being to maintain individual doses low in comparison to background(e.g., a few millirem in a year or less). In any case, the limits must be a fraction (e.g., 1/4 or less of the primary dose limit for the public). ALARA analysis should be consistent with the March 1991 DOE environmental ALARA guidance.

- 3) To ensure that DOE releases do not violate NRC licensing requirements, authorized limits for the release of property from DOE control should be coordinated with, and found acceptable to, appropriate Agreement State representatives or, where appropriate, NRC.

The all source criterion may be assumed satisfied if the ALARA criterion and its associated dose constraint and goals are adequately addressed. Generally, the use of the surface contamination guidelines discussed below will not require a quantitative dose assessment or detailed ALARA analysis; however, a qualitative review should be done and documented to determine if it is practicable to set authorized limits for surfaces lower than the guideline values.

4.0 Guidelines for Property.

4.1 Surface Contamination Guidelines. DOE 5400.5 Figure IV-1 includes surface guidelines for radionuclides other than transuranics and alpha emitters (Row 1 of Figure IV-1¹) and tritium. The only DOE-approved guidelines for release of property and material having residual surface concentrations of transuranics and the row 1 alpha emitters are contained in DOE/CH/8901, June 1989, see DOE 5400.5 Section IV.2, and were first approved for DOE-wide application in 1984 (memorandum from J. R. Maher to distribution, March 15, 1984). These values are consistent with NRC guidance ("Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source and Special Nuclear Material," July 1992, and "Termination of Operating, Licenses for Nuclear Reactors," Regulatory Guide 1.86, June 1964). The Surface Concentration Guidelines are restated in Table 1 of the EH guidance in Appendix A.

Field offices may approve authorized limits and survey protocol that meet these requirements. ALARA process requirements apply in addition to the surface contamination

¹Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231.

guidelines. However, in most cases, the ALARA requirements can be satisfied with a semi-quantitative or qualitative assessment². The level of detail should be commensurate to the potential doses. Qualitative screening estimates are adequate if they project collective doses to be less than 10 person-rem in total or annually. Additional discussion of ALARA considerations are presented in Appendix A. Section 12.0, References, includes several reports and dose assessment tools which may be useful in computing or bounding doses.

4.2 Volume and Mass Contamination and Alternate Surface Limits. DOE has no DOE-wide approved guidelines for release of non-real property or structures containing residual radioactive material in mass or volume. Authorized limits for property subject to contamination in mass or volume must be derived consistent with the ALARA process and approved by DOE headquarters (EH-1) consistent with DOE 5400.5, Section II.5.c and this guidance (see Section 5.0 "DOE Approval of Authorized Limits and Measurement Protocols for Release"). Similarly, authorized limits for surface contamination different than those previously discussed may be approved by DOE on a case-by-case basis using the ALARA process. Authorized limits for the release of non-real property such as equipment or a number of similar items may be developed and approved by the Department. Guidance for the development of necessary protocols is also contained in the "Environmental Implementation Guide for Radiological Survey Procedures," Section 4.5, which was released for comment and use on November 30, 1992.

²While DOE has reviewed the surface contamination guidelines in the table and determined that they are protective, the level of protection is not necessarily uniform and hence, although the ALARA assessment may be qualitative or at most semi-quantitative, the level of detail should be commensurate with the potential maximum dose associated with the release. Radionuclides such as Th-232, Ra-226, and natural uranium have potential maximum doses up to a few mrem/year while I-129, Th-230, and Sr-90 have potential maximum doses of much less than 0.1 mrem/year. Release of property that meet the guidelines for the latter radionuclides justify very minimal ALARA consideration.

4.3 Tritium. DOE surface guidelines in DOE 5400.5 do not specifically address tritium (^3H). Because tritium typically penetrates material it contacts, the surface guidelines in Figure IV-1 are not directly applicable to tritium contamination. Furthermore, the measurement of "fixed" tritium on surfaces at these levels is problematic. As a result, the beta emitter values were not specifically recommended for tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee in the report, "Recommended Tritium Surface Contamination Release Guides," February 1991, and have assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of 10,000 dpm/100 cm² as an interim guideline for removable tritium. This guideline for removable surface contamination ensures that non-removable fractions and contamination in mass will not cause unacceptable exposures. The measurements should be conducted by a standard smear measurement³ but using a wet swipe or piece of Styrofoam. If the property has been recently contaminated or recently decontaminated, follow-up measurements (smears) should be conducted at regular time intervals to ensure that there is not a build-up of contamination over time.

5.0 DOE Approval of Authorized Limits and Measurement Protocols for Release. While application, implementation and approval of authorized limits for property subject to surface contamination are the responsibility of DOE field and program elements, DOE 5400.5 requires EH-1 approval of authorized limits for residual radioactive material in mass or volume. However, under the November 17, 1995 EH guidance and the January 7, 1997 EM guidance, authorized limits and survey protocol for residual radioactive material in mass or volume or surface contamination limits in lieu of DOE Order 5400.5 Table 1 values may be derived and approved by DOE field office managers without EH-1 written approval if the following conditions are met:

³See Section 4.2, "Environmental Implementation Guide for Radiological Survey Procedures," November 1992, distributed for use and comment to Distribution for Raymond F. Pelletier, Office of Environmental Guidance, November 30, 1992.

1. DOE Order 5400.5 requirements are met;
2. Based on a realistic but reasonably conservative assessment of potential doses, it is demonstrated to the satisfaction of the responsible Field Office Manager that:
 - a) the release or releases of the subject material will not cause a maximum individual dose to a member of the public in excess of 1 mrem in a year or a collective dose of more than 10 person-rem in a year; and
 - b) A procedure is in place to maintain records of the releases consistent with the DOE 5400.5 requirements (DOE 5400.5 Chapter II, paragraphs 5.c.(5), 8.a, & 8.b) and that survey or measurement results are reported consistent with the data reporting guidelines in the DOE November 1992 radiological survey guidance and DOE/EH-173T; and
3. A copy of the authorized limits, measurement/survey protocols and procedures, supporting documentation including a statement that the ALARA process requirements have been achieved, and appropriate material documenting any necessary coordination with the state(s) or NRC are provided to the Office of Environment, EH-4, at least 40 working days prior to the authorized limits becoming effective. EH will provide written notification of receipt of the material. Unless EH-4 notifies the Field or Program Office of problems within 20 working days of receipt, the authorized limits may be considered approved by EH. Authorized limits that do not meet the Field approval criteria stated above must be approved by EH-1. It is recommended that the analysis be coordinated with EH-412, the Air, Water, and Radiation Division prior to submitting the request for approval to EH-1.

6.0 Coordination and External Requirements. TSD facilities have waste acceptance criteria (WAC) and are subject to State and local requirements on radioactive materials. In addition to meeting DOE requirements, DOE-established authorized radiological limits and release protocols must be consistent with the WAC, and Federal, State and local

requirements for these TSD facilities. DOE must ensure that the authorized limits are coordinated with, and acceptable to, the TSD facility operator implementing the WAC and Federal, State, and local representatives responsible for implementing waste regulations to ensure that DOE releases do not violate facility-specific radiological protection requirements. DOE must also ensure that releases do not violate U.S. Nuclear Regulatory Commission (NRC) licensing requirements by coordinating with the appropriate Agreement State representative or, where appropriate, with the NRC.

6.1 The Coordination Process. A key to successful coordination and agreement with Federal, State, and local regulators and commercial facility operators is the early involvement of all parties. It is recommended that DOE sites perform preliminary or screening ALARA evaluations and dose assessments to assess the viability of releasing the waste in accordance with DOE requirements prior to approaching external regulators or disposal facility operators. If the results of the preliminary assessments indicate that release is feasible, it is recommended that the site contact TSD facility regulators and operators prior to conduct of detailed ALARA and dose assessments to allow incorporation of operator and regulator requirements, if any, into the detailed analyses.

6.2 Coordination with TSD Regulators. A number of states have expressed interest in being involved at the start of the process in which a DOE site is considering the release of wastes for shipment to commercial TSD facilities not licensed to handle radioactive wastes. Early involvement of state regulators in the evaluations and analyses supporting development of DOE authorized limits should foster development of a good working relationship between DOE and the states and facilitate efforts to establish mutually acceptable limits.

It is necessary to obtain the States's agreement with any DOE determination that the material can be accepted by the facility. The exact form of this agreement (approval/acceptance/concurrence, etc.) will likely vary from state to state and with the involved regulatory agency within the state.

6.3 Coordination with the Receiving Facility. Acceptance by Federal, State, and local authorities does not necessarily ensure acceptance by the commercial facility operator. Consequently, the commercial facility should be contacted at the same time as the appropriate regulatory authorities. A number of facilities have indicated a willingness to handle wastes containing residual radioactive material if the regulators having jurisdiction over their operating licenses/permits would agree to allow the facilities to accept the waste.

Commercial facilities operate under licenses and permits issued by a number of Federal, State, and local authorities. Every TSD facility has defined WAC that govern the characteristics of the hazardous waste to be accepted for disposal at the site. The WAC are based upon criteria imposed by the regulators as a condition of granting the site operating permits. In particular, under existing licenses/permits/WAC, wastes containing radioactive material is generally not accepted at commercial facilities that are not specifically licensed to handle radioactive material. Waste should be sent only to appropriately licensed/permitted facilities that are EPA or State approved and are in compliance with all applicable requirements. Once all approvals are obtained indicating that the waste can be accepted, it can then be classified and handled based upon its other characteristics, e.g., hazardous or sanitary.

7.0 Reporting Results/Lessons Learned. Releases successfully accomplished using the protocols described above effectively establish and validate release limits on a case-by-case basis. Such limits are tracked by EH-41 and the respective program offices as part of the required reviews by DOE Headquarters. Information provided on the successful implementation of case-by-case authorized limits provide useful data for use within DOE and, possibly, for broader application. To provide for dissemination of this information, EM-30 requests that lessons learned on experience with implementation of authorized release limits under BOTH guidance packages (EH and EM) be documented and forwarded to:

U.S. Department of Energy
Office of Technical Services (EM-37)
Office of Waste Management
Environmental Management
19901 Germantown Road
Germantown, MD 20874-1290
Telephone: (301) 903-7164
FAX: (301) 903-7166

8.0 Technical Assistance. To assist DOE organizations faced with the task of determining the criteria or protocols needed to make efficient and effective releases of subject wastes; both EH and EM have provided for additional guidance and some direct assistance to Field organizations. For Dose Assessment purposes (both on and off-site, including workers, the public, and the environment) EM has developed a user friendly computer code documented in, "TSD-DOSE: A Radiological Dose Assessment Model for Treatment, Storage, and Disposal Facilities," (ANL/EAD/LD-4 Rev. 1), September 1998. The code is available from EM-30 who can also refer to technical support contractors for "hands-on" field support. Additionally, EH has provided for ALARA analysis concerns in, "ALARA Analysis of Radiological Control Criteria Associated with Alternatives for Disposal of Hazardous Wastes," (PNNL-xxxx/UC-xxxx), September 1997.

Field office elements may request technical assistance from EH in the review or development of such authorized limits; however, such assistance should be requested as early as possible in the process but at least 90 working days before the desired implementation date for the authorized limits.

Nothing in this guidance should be construed to override or replace the need for field elements to coordinate or consult with DOE program offices having jurisdiction over actions or portions of the actions covered by the authorized limits. Authorized limits for residual radioactive material in mass or volume that do not meet the field approval criteria stated above must be approved by EH-1. It is recommended that the DOE elements

responsible for requesting EH approval, coordinate the analyses with EH 412, the Air, Water and Radiation Division prior to submitting the request to EH-1.

9.0 Documentation. Appropriate documentation must be retained to provide a clear record of the coordination between all parties involved, all agreements/approvals/concurrences received, and related ALARA evaluations and dose assessments. This documentation should include: DOE site and/or EH headquarters approvals of authorized limits, Field procedures and protocols associated with the authorized limits, documentation of regulatory agency coordination and acceptance similar communications from the facility that will receive the wastes, all related analyses, and such other related documents which will clearly establish that all parties fully understand the actions proposed and that the actions may proceed

10.0 Summary. This document provides guidance to assist DOE waste managers in the establishment of authorized limits for disposal of waste contaminated with residual radioactivity at (1) DOE-operated on-site landfills, (2) public or off-site landfills, and (3) hazardous waste facilities. Specific guidance is provided to assist in coordinating with and obtaining agreement of Federal, State, and local regulatory agencies, and operators of TSD facilities, to permit the shipment of hazardous and non-hazardous wastes containing residual radioactive materials to commercial treatment, storage, and/or disposal facilities not licensed to handle radioactive materials. The guidance is intended to supplement existing guidance on release of waste containing residual radioactive materials and to assist in improving communications among DOE, Federal, State, and local regulatory authorities and commercial facility operators.

11.0 References

1. DOE Order 5400.5, *Radiation Protection of the Public and Environment*. U.S. Department of Energy, Feb. 8, 1990, Revised January 7, 1993 (Change 2).

2. Pelletier, R. F., *Application of DOE 5400.5 Requirement for Release and Control of Property Containing Residual Radioactive Material*. Memorandum, U.S. Department of Energy, Washington D.C., November 17, 1995.
3. Lytle, J. E., *Shipment of Waste Originating in Radiation Control Areas*. Memorandum, U.S. Department of Energy, Washington, D.C., May 17, 1991.
4. *Performance Objective for Certification of Non-Radioactive Hazardous Waste*. Office of Waste Management, Office of Environmental Management, U.S. Department of Energy, Washington, D.C., November 15, 1991 (Revision 1, February 17, 1995).
5. Lytle, J. E., *Delegation of Authority for Lifting the Non-Radioactive Hazardous Waste Shipment Moratorium*. Memorandum, U.S. Department of Energy, Washington, D.C., March 16, 1995.
6. Costello, W. J., *Audit of the DOE's Distinctions Between Hazardous Waste and Mixed Waste, Audit Report No. ER-L-96-07*, U.S. Department of Energy, Washington, D.C., July 5, 1996.
7. Frei, M. W., *Establishment and Coordination of Authorized Limits for Release of Hazardous Waste Containing Residual Radioactive Material*, Memorandum, U.S. Department of Energy, Washington, D.C., January 1997.

12.0 Bibliography of Technical Resources

12.1 ALARA

R. Pelletier, EH-41, *DOE Guidance on the Procedures in Applying the ALARA Process for Compliance with DOE 5400.5*, Memorandum, Department of Energy, Office of Environmental Guidance, March 8, 1991.

ANL/EAD/LD-2, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0, Chapters 1 and 5 and Appendix M, September 1993.

12.2 Measurement and Data Reporting

DOE Manual for Use and Comment, *Environmental Implementation Guide for Radiological Survey Procedures*, Department of Energy, Office of Environmental Guidance, November 1992

DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*, Department of Energy, January 1991.

NUREG/CR-5849, *Manual for Conducting Radiological Surveys in Support of License Termination*, U.S. Nuclear Regulatory Commission, June 1992.

NUREG-1505, *Draft Report, A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys*, U.S. Nuclear Regulatory Commission, August 1995.

NUREG-1506, *Draft Report, Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria*, U.S. Nuclear Regulatory Commission, August 1995.

12.3 Dose Factors

EPA-520-1-88-020, *Federal Guidance Report No. 11, Limiting Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion and Ingestion*, Environmental Protection Agency, September 1988.

EPA 402-R-93-081, *Federal Guidance Report No. 12, External Exposure to Radionuclides in Air, Water and Soil*, Environmental Protection Agency, September 1993.

12.4 Tools for Dose Assessment

ANL/EAD/LD-2, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0*, Published by Argonne National Laboratory and prepared by ANL and DOE staff, September 1993.

ANL/EAIS-8, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil*, Argonne National Laboratory, April 1993.

ANL/EAIS/TM-103, *A Compilation of Radionuclide Transfer Factors for Plant, Meat, Milk and Aquatic Food Pathways and Suggested Default Values for the RESRAD Code*, Argonne National Laboratory, August 1993.

PNL-9405/UC-610, *Radiation Dose Assessment Methodology and Preliminary Dose Estimates to Support U.S. Department of Energy Radiation Control Criteria for Regulated Treatment and Disposal of Hazardous Waste and Materials*. Battelle, July 1995.

PNL-8724, *Radiation Dose Assessments to Support Evaluations of Radiological Control Levels for Recycling or Reuse of Material and Equipment*, Pacific Northwest Laboratory, July 1995.

ANL/EAD.LD-3, *RESRAD-Build: A Computer Model for Analyzing the Radiological Doses Resulting from the Remediation and Occupancy of Buildings Contaminated with Radioactive Material*, Argonne National Laboratory, November 1994.

NUREG-1500, *Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC's Staff's Draft for Comment*, U.S. Nuclear Regulatory Commission, August 1994.

NUREG-5512, *Residual Radioactive Contamination From Decommissioning - Technical Basis for Translating Contamination to Annual Total Effective Dose Equivalent*, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, October 1992.

12.5 Surface Guidelines

NRC publication, *Guidelines for Decontamination and Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material*, U.S. Nuclear Regulatory Commission, July 1984.

NRC Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, U.S. Nuclear Regulatory Commission, June 1976.

DOE/CH-8901, *Manual for Implementing Residual Radioactive Material Guidelines - A Supplement to the U.S. Department of Energy Guidelines for Residual Radioactive Material at FUSRAP and SFMP Sites*, Department of Energy, June 1989.

DOE Guidance Memorandum, *"Unrestricted Release of Radioactively Contaminated Personal Property,"* J. Maher, DOE Office of Nuclear Safety, March 15, 1984.

DOE Committee Report, *Recommended Tritium Surface Contamination Release Guides*, DOE Tritium Surface Contamination Limits Committee, February 1991.

APPENDIX A

APPENDIX A

Application of DOE 5400.5 Requirements for Release and Control of Property Containing Residual Radioactive Material

NOTE: This document has been electronically reproduced by scanning a copy of the original. Only the transmittal memorandum, the main guidance, and Appendix I of the original are not provided, the extensive collection of attachments included with the original are not included. The reader should be aware that page numbers as referred to in the text may not correctly correspond with the actual page numbers due to differences between the wordprocessing software used to produce the original and the wordprocessing software used to produce the document presented in this appendix. The reader is encouraged to obtain a complete copy of the original Eh guidance from the Air, Water and Radiation Division (EH-412) of the Department of Energy Office of Environment Policy and Assistance.

**Response to questions and guidance regarding implementation of
DOE 5400.5 Section II.5 and Chapter IV.**

DOE Radiological Release Criteria:

Order DOE 5400.5. chapters II and IV contain the Department's requirements for controlling and releasing property containing residual radioactive material. This guidance addresses release of non-real property and supplements information on release of structures.

The requirements for releasing real property, in lands and structures, are specifically documented in Chapter IV of DOE 5400.5 and additional guidance for applying the process is included in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0," ANL/EAD/LD-2, September 1993 and related materials (see reference list). It is the responsibility of DOE field and, as appropriate, program offices to review and, where appropriate, approve measurement procedures and methodology and authorized limits for soil (lands) which meet DOE requirements for restricted or unrestricted use as specified in the Order and associated guidance. The information that follows relates primarily to the release of non-real property including non-hazardous wastes, small items and equipment. The discussion relating to the use of DOE-approved surface contamination guidelines is also applicable to the release of structures.

DOE Requirements and Related Commercial Requirements:

Statement of Issue: Under the Atomic Energy Act of 1954 as amended, DOE has a responsibility to regulate the activities of its contractors and operations in a manner that protects the public and environment from radiation hazards associated with its operations. The Nuclear Regulatory Commission (NRC) and its Agreement States have similar authorities and responsibilities with regard to the commercial sector. In general, DOE requirements with regard to public and environmental protection are consistent with, and similarly protective as, those of the Nuclear Regulatory Commission and hence, are compatible with commercial standards. These include discharge limits as well as release limits. However, the residual radioactive material release limits for property are somewhat more complicated than effluent releases in that the property is likely being released to members of the general public.

Section 61.3 of 10 CFR Part 61 states that:

"(a) No person may receive, possess, and dispose of radioactive waste containing source, special nuclear or by-product material at a land disposal facility unless authorized by a license issued by the Commission pursuant to this part, or unless exemption has been granted by the Commission under §61.6 of this Part." Many of the states' have enacted legislation that specifically preclude the disposal of any radioactive material, or formerly regulated radioactive material, except in disposal facilities designed and licensed for radioactive waste. The words "formally regulated" have apparently been included to preclude the disposal of "Below Regulatory Concern" materials according to a draft policy that at one time had been published by the Nuclear Regulatory Commission.

The DOE field elements have asked EH to explain the relationship between DOE release criteria and policy and the requirements established for the commercial sector and non-DOE materials.

Analysis and Response: The discussion and analysis to follow is limited to radiological protection. All DOE facilities and operations must conform to applicable external regulatory requirements. There are three general situations for which the DOE radiological criteria may be used. They are:

- (1) Application of DOE-derived and -approved radiological release criteria for disposal of material and property in a DOE-operated onsite landfill.
- (2) Application of DOE-derived and -approved radiological release criteria for disposal of material and property in a public or offsite landfill.
- (3) Application of DOE-derived and -approved radiological release criteria for sale or transfer of property to members of the public.

DOE On-site Landfill:

In situation (1) the Department has the responsibility and authority to establish limits for protection of the public and environment either in the form of radionuclide release criteria or waste acceptance criteria for disposal of materials in a DOE onsite landfill. Disposal of such material

must conform to the requirements of Order DOE 5400.5 (and, when promulgated, as final rule 10 CFR Part 834) and applicable portions of Order DOE 5820.2A. DOE must establish limits such that doses to the public will be as far below the dose limits in DOE 5400.5 (or 10 CFR Part 834, as appropriate) as is practicable. This is determined on the basis of the ALARA Process (As low As Reasonably Achievable process, see DOE March 1991 environmental ALARA guidance). The criteria should be such that it is not likely that disposal of materials into the landfill will result in a future requirement for remediation of the landfill subject to Chapter IV of DOE 5400.5. In making this determination, consideration should also be given to radionuclide limits established in CERCLA and RCRA corrective action Records of Decisions in neighboring areas of the site. To assure that these requirements and goals are achieved, authorized radiological limits for material sent to a DOE landfill (which is not an authorized low-level waste disposal facility) must be approved by DOE and should be:

- Selected (and approved by DOE) on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and selected to ensure that individual doses to the public are less than 25 mrem in a year with a goal of a few millirem in a year or less.
- Evaluated to ensure ground water will be protected in a manner consistent with the objectives of the site's Ground-Water Protection Program objectives (DOE 5400.1) and/or applicable Federal or State requirements.
- Evaluated to verify that release of the landfill property would not be expected to require remediation under DOE 5400.5 requirements for release of property containing residual radioactive material giving due consideration to experience gained from past or on-going CERCLA or RCRA cleanup actions.

The ALARA process should consider factors such as estimated concentrations in waste, total activity (source term) being or likely to be disposed in the landfill, fraction of total waste containing residual radioactivity, estimated individual doses from expected or likely use scenarios, an estimate or assessment of collective doses in relation to other alternatives and potential impacts on natural resources such as ground water. In considering and assessing dose factors such as land use plans and site maintenance, benchmark cleanup standards, special waste form

characteristics, and so forth may be considered in the development of authorized limits and acceptance criteria. The detail and complexity of the analysis should be commensurate with potential risks and costs, i.e., if potential individual and collective doses are very low a semi-quantitative or screening analysis may be acceptable (see DOE environmental ALARA guidance). However, other factors may also be important in determining the level of detail needed to approve such limits. For example, although screening analyses (conservative bounding estimates) of activity and potential doses that demonstrate low risk potential may be adequate to show that ALARA has been implemented, they are likely to significantly overestimate residual activity. The use of bounding estimates without adequate documentation of uncertainties or likely doses or quantities of material may result in misleading documentation that in turn could lead to costly and unnecessary investigations in the future. Therefore, it is recommended that procedures be established to document source term estimates as realistically as practicable or that bounding estimates be qualified with a discussion of uncertainty or estimates of expected quantities of residual radioactive material. Documentation supporting the authorized limits or acceptance criteria and disposal records should be sufficient to ensure that the site will not have to be remediated in the future or even unnecessarily surveyed to document its radiological condition.

Off-site Landfills:

In situation (2) DOE establishes and approves authorized limits and associated survey and release protocol for material that will be disposed in a non-DOE landfill. The recommended criteria for such a situation are similar to those established for release of property except that there is an additional consideration. Many local landfills have waste acceptance criteria or are subject to State requirements for radioactive material. In addition to meeting DOE requirements to establish authorized limits and survey, review and documentation protocols that ensure doses are as far below the primary dose limit as is practicable, authorized limits and release protocol must meet acceptance criteria and State requirements for the subject landfills. To ensure that these requirements and goals are achieved, authorized limits for material sent to a non-DOE landfill (which is not an authorized low-level waste disposal facility) should be:

- Selected (and approved by DOE) on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and to

ensure that individual doses to the public are less than 25 mrem in a year with a goal of a few millirem in a year or less.

- Evaluated to ensure that ground water will be protected in a manner consistent with the objectives of the applicable State regulations and guidelines
- Assessed to ensure that release of the landfill property would not be expected to require remediation under DOE 5400.5 or other applicable requirements for release of property containing residual radioactive material as a result of DOE disposals.
- Coordinated with and acceptable to the landfill operator implementing the acceptance criteria and State representatives responsible for implementing solid waste regulations to ensure that DOE releases do not violate landfill-specific radiological protection requirements.

Equipment and Personal Property:

Under situation (3) the Department transfers ownership (either by sale or other means) to members of the public or releases personal property from DOE radiological control. Although DOE and DOE contractors are exempt from 10 CFR Part 61 and 10 CFR Part 20, individuals receiving the subject material are not. The Department will not transfer licensable materials to members of the public who are not licensed to receive them. Therefore, as part of the process for developing authorized limits for residual radioactive material and the associated survey and review protocol to ensure that released material and property are acceptable for public use, the Department must ensure that such property and material do not contain licensable amounts or concentrations of radionuclides. Therefore, the following criteria should be implemented to comply with DOE 5400.5 residual radioactive material requirements:

- Authorized limits for property must ensure that doses to the public from all sources are less than the primary dose limit for all sources (100 mrem in a year).
- Authorized limits for the property must be developed and approved by DOE consistent with the ALARA process. Appropriate protocols for survey and review of the release of such property must accompany the approval of the authorized limits. These limits shall be based

on a documented finding that they are as low as practicable as determined through the ALARA process with a goal being to maintain individual doses low in comparison to background(e.g., a few millirem in a year or less). In any case, the limits must be a fraction (e.g., 1/4 or less of the primary dose limit for the public). ALARA analysis should be consistent with the March 1991 DOE environmental ALARA guidance.

- To ensure that DOE releases do not violate NRC licensing requirements, authorized limits for the release of property from DOE control should be coordinated with, and found acceptable to, appropriate Agreement State representatives or, where appropriate, NRC.

The all source criterion may be assumed satisfied if the ALARA criterion and its associated dose constraint and goals are adequately addressed. Generally, the use of the surface contamination guidelines discussed below will not require a quantitative dose assessment or detailed ALARA analysis; however, a qualitative review should be done and documented to determine if it is practicable to set authorized limits for surfaces lower than the guideline values.

DOE Approval of Authorized Limits and Measurement Protocols for Release:

While application, implementation and approval of authorized limits for property subject to surface contamination (consistent with guidelines described below) are the responsibility of DOE field and program elements, DOE 5400.5 requires EH-1 approval of authorized limits for residual radioactive material in mass or volume. However, authorized limits and survey protocol for residual radioactive material in mass or volume or surface contamination limits in lieu of Table 1 may be derived and approved by DOE field office managers without EH-1 written approval if:

- (1) The applicable criteria above are 'appropriately addressed;
- (2) Based on a realistic but reasonably conservative assessment. of potential doses, it is demonstrated to the satisfaction of the responsible field office manager, that:

, the release or releases of the subject material will not cause a maximum individual dose to a member of the public in excess of 1 mrem in a year or a collective dose of more than 10 person-rem in a year; and

- , a procedure is in place to maintain records of the releases consistent with DOE 5400.5 requirements and that survey or measurement results are reported consistent with the data reporting guidelines in the DOE November 1992 radiological survey guidance and DOE/EH-173T; and

(3) A copy of the authorized limits, measurement/survey protocols and procedures, supporting documentation including a statement that the ALARA process requirements have been achieved, and appropriate material documenting any necessary coordination with the state(s) or NRC are provided to the Office of Environment, EH-4, at least 40 working days prior to the authorized limits becoming effective.

- , EH-4 will provide written notification to the field office of the receipt of the material and
- , notify the field, if the authorized limits or supporting material are not acceptable, within 20 days of receipt, otherwise the authorized limits (including any conditions or limitations set forth by the approving DOE field elements) may be considered approved without written EH-1 approval.

Field office elements may request technical assistance in the review or development of such authorized limits; however, such assistance should be requested as early as possible in the process but at least 90 working days before the desired implementation date for the authorized limits. Nothing in this guidance should be construed to override or replace the need for field elements to coordinate or consult with DOE program offices having jurisdiction over actions or portions of the actions covered by the authorized limits. Authorized limits for residual radioactive material in mass or volume that do not meet the field approval criteria stated above must be approved by EH-1. It is recommended that the DOE elements responsible for requesting EH approval, coordinate the analyses with EH 412, the Air, Water and Radiation Division prior to submitting the request to EH-1.

Guidelines for Property:

Surface Contamination Guidelines:

Statement of Issue: DOE guidelines for release of residual radioactive material on surfaces are incomplete; the values for transuranics and alpha emitters are not included. EH-41 was requested to clarify existing guidance for the use of these guidelines.

Response: DOE. 5400.5 Figure IV-1 includes surface guidelines for radionuclides other than transuranics and alpha emitters (Row 1 of Figure IV-1⁴) and tritium. The only DOE-approved guidelines for release of property and material having residual surface concentrations of transuranics and the row 1 alpha emitters are contained in DOE/CH/8901, June 1989, see DOE 5400.5 Section IV.2, and were first approved for DOE-wide application in 1984 (memorandum from J. R. Maher to distribution, March 15, 1984). These values are consistent with NRC guidance ("Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source and Special Nuclear Material," July 1992, and "Termination of Operating, Licenses for Nuclear Reactors," Regulatory Guide 1.86, June 1964). The Surface Concentration Guidelines are restated in Table 1.

Field offices may approve authorized limits and survey protocol that meet these requirements. ALARA process requirements apply in addition to the guidelines restated in Table 1; however, in most cases, the ALARA requirements can be satisfied with a semi-quantitative or qualitative assessment⁵. Although full optimization studies are likely to be unnecessary because use of the surface guidelines generally ensure individual and collective doses will be low, it is desirable, where practicable, to estimate or bound potential individual doses and collective doses to the public associated with the release or annual releases (if the authorized limit will be applied to operational releases) and include the estimates in the documentation supporting the authorized limits. This may be important when the authorized limits are developed as part of a process for releasing non-real property on a regular basis over a long operational period. The level of detail should be commensurate to the potential doses. Qualitative screening

⁴Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231.

⁵While DOE has reviewed the surface contamination guidelines in the table and determined that they are protective, the level of protection is not necessarily uniform and hence, although the ALARA assessment may be qualitative or at most semi-quantitative, the level of detail should be commensurate with the potential maximum dose associated with the release. Radionuclides such as Th-232, Ra-226, and natural uranium have potential maximum doses up to a few mrem/year while I-129, Th-230, and Sr-90 have potential maximum doses of much less than 0.1 mrem/year. Release of property that meet the guidelines for the latter radionuclides justify very minimal ALARA consideration.

estimates are adequate if they project collective doses to be less than 10 person-rem in total or annually. The attached reference list includes several reports and dose assessment tools which may be useful in computing or bounding doses.

Volume and Mass Contamination and Alternate Surface Limits. DOE has no DOE-wide approved guidelines for release of non-real property or structures containing residual radioactive material in mass or volume. Authorized limits for property subject to contamination in mass or volume must be derived consistent with the ALARA process and approved by DOE headquarters (EH-1) consistent with DOE 5400.5, Section II.5.c and this guidance (see "DOE Approval of Authorized Limits" above). Similarly, authorized limits for surface contamination different than those previously discussed may be approved by DOE on a case-by-case basis using the ALARA process. Authorized limits for the release of non-real property such as equipment or a number of similar items may be developed and approved by the Department. Guidance for the development of necessary protocols is also contained in the "Environmental Implementation Guide for Radiological Survey Procedures," Section 4.5, which was released for comment and use on November 30, 1992.

Tritium:

Statement of Issue: DOE surface guidelines in DOE 5400.5 do not specifically address tritium (^3H). EH was requested to indicate whether the guidelines for beta emitters apply to tritium or if other values are applicable.

Response: Because tritium typically penetrates material it contacts, the surface guidelines in Figure IV-1 are not directly applicable to tritium contamination. Furthermore, the measurement of "fixed" tritium on surfaces at these levels is problematic. As a result, the beta emitter values were not specifically recommended for tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee in the report, "Recommended Tritium Surface Contamination Release Guides," February 1991, and have assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of 10,000 dpm/100 cm² as an interim guideline for removable tritium. This guideline for removable surface contamination ensures that non-removable fractions and contamination in mass will not cause unacceptable exposures. The

measurements should be conducted by a standard smear measurement⁶ but using a wet swipe or piece of styrofoam. If the property has been recently contaminated or recently decontaminated, follow-up measurements (smears) should be conducted at regular time intervals to ensure that there is not a build-up of contamination over time.

General Issues and Coordination:

The Department is presently conducting analyses, developing methodologies and working with EPA and NRC to develop more risk-based values that will ultimately replace (or confirm) the values in Figure IV-1, DOE/CH-8901, and the interim tritium limit discussed above. However, in the interim, the Department has determined that although the current levels are not internally consistent they are protective of the public and environment and can, therefore, continue to be used in the establishment of authorized limits for release at DOE facilities.

The Department also permits case-by-case determination of other limits where they are based on an ALARA process assessment and ensure that doses to the public will be as far below the DOE dose limits and constraints as is practicable. The derivation and DOE approval of such authorized limits should be consistent with the criteria discussed above. EH and EM have provided various tools (models, codes and handbooks) to support these analyses. They are listed in the references.

While risk-based standards are being developed NRC and its Agreement States are continuing to conduct site specific reviews and approvals consistent with the Commission's existing guidance (see attached October 25, 1995, letter Weber, NRC, to Wallo, DOE, commenting on this guidance). However, in coordinating with Agreement States or NRC it may be useful for DOE elements to be aware of NRC's proposed 15 mrem/year dose constraint. Although this is only a proposed standard, the Commission has issued several draft guidance documents which may provide useful information in developing DOE survey protocols (see references). NUREG-1500 and NUREG-5512 may also be useful in benchmarking DOE dose assessments.

⁶See Section 4.2, "Environmental Implementation Guide for Radiological Survey Procedures," November 1992, distributed for use and comment to Distribution for Raymond F. Pelletier, Office of Environmental Guidance, November 30, 1992.

Table 1. Surface Activity Guidelines
Allowable Total Residual Surface Activity (dpm/100cm²)⁷

Radionuclides ⁸	Average ^{9/10}	Maximum ^{7/11}	Removable ¹²
Group 1 - Transuranics, I-125, I-129, Ac-227, Ra-226, Ra-228, Th-228, Th-230, Pa-231	100	300	20
Group 2 - Th-natural, Sr-90, I-126, I-131, I-133, Ra-223, Ra-224, U-232, Th-232	1000	3000	200
Group 3 - U-natural, U-235, U-238, and associated decay products, alpha emitters	5000	15000	1000
Group 4 - Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous) ¹³	5000	15000	1000

⁷As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

⁸Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

⁹Measurements of average contamination should not be averaged over an area of more than 1 m². For objects of smaller surface area, the average should be derived for each such object.

¹⁰The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h respectively, at 1 cm.

¹¹The maximum contamination level applies to an area of not more than 100 cm².

¹²The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on object of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

¹³This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

Tritium (applicable to surface and subsurface) ¹⁴	N/A	N/A	10000
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¹⁴Property recently exposed or decontaminated, should have measurements (smears) at regular time intervals to ensure that there is not a build-up of contamination over time. Because tritium typically penetrates material it contacts, the surface guidelines in group 4 are not applicable to tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee ("Recommended Tritium Surface Contamination Release Guides," February 1991), and has assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of the stated guidelines as an interim value for removable tritium. Measurements demonstrating compliance of the removable fraction of tritium on surfaces with this guideline are acceptable to ensure that non-removable fractions and residual tritium in mass will not cause exposures that exceed DOE dose limits and constraints.

References:

Requirements:

Order DOE 5400.5, Radiation Protection of the Public and Environment, Department of Energy, Feb. 8, 1990, revised Jan. 7, 1992 (change 2).

Surface Guidelines:

NRC publication, Guidelines for Decontamination and Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material, U.S. Nuclear Regulatory Commission, July 1984.

NRC Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors, U.S. Nuclear Regulatory Commission, June 1976.

DOE/CH-8901, Manual for Implementing Residual Radioactive Material Guidelines - A Supplement to the U.S. Department of Energy Guidelines for Residual Radioactive Material at FUSRAP and SFMP Sites, Department of Energy, June 1989.

DOE Guidance Memorandum, "Unrestricted Release of Radioactively Contaminated Personal Property", J. Maher, DOE Office of Nuclear Safety, Mar. 15, 1984.

DOE Committee Report, Recommended Tritium Surface Contamination Release Guides, DOE Tritium Surface Contamination Limits Committee, Feb. 1991.

ALARA:

DOE Guidance: DOE Guidance on the Procedures in Applying the ALARA Process for Compliance with DOE 5400.5, Department of Energy, Office of Environmental Guidance, March 8, 1991.

ANL/EAD/LD-2, Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Chapters 1 and 5 and Appendix M, September 1993.

Measurement and Data Reporting:

DOE Manual for Use and Comment, Environmental Implementation Guide for Radiological Survey Procedures, Department of Energy, Office of Environmental Guidance, Nov. 1992

DOE/EH-0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, Department of Energy, Jan. 1991.

NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination, U.S. Nuclear Regulatory Commission, June 1992.

NUREG-1505, Draft Report, A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys, U.S. Nuclear Regulatory Commission, August 1995.

NUREG-1506, Draft Report, Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria, U.S. Nuclear Regulatory Commission, August 1995.

Dose Factors:

EPA-520-1-88-020, Federal Guidance Report No. 11, Limiting Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion and Ingestion, Environmental Protection Agency, Sept. 1988.

EPA 402-R-93-081, Federal Guidance Report No. 12, External Exposure to Radionuclides in Air, Water and Soil, Environmental Protection Agency, Sept. 1993

Tools for Dose Assessment:

ANL/EAD/LD-2, Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Published by Argonne National Laboratory and prepared by ANL and DOE staff, September, 1993.

ANL/EAIS-8, Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil, Argonne National Laboratory, April 1993.

ANL/EAIS/TM-103, A Compilation of Radionuclide Transfer Factors for Plant, Meat, Milk and Aquatic Food Pathways and Suggested Default Values for the RESRAD Code, Argonne National Laboratory, August 1993.

PNL-8724, Radiation Dose Assessments to Support Evaluations of Radiological Control Levels for Recycling or Reuse of Material and Equipment, Pacific Northwest Laboratory, July 1995.

ANL/EAD/LD-3, RESRAD-Build: A Computer Model for Analyzing the Radiological Doses Resulting from the Remediation and Occupancy of Buildings Contaminated with Radioactive Material, Argonne National Laboratory, November 1994.

NUREG-1500, Working Draft Regulatory Guide on Release Criteria for Decommissioning NRC's Staff's Draft for Comment, U.S. Nuclear Regulatory Commission, August 1994.

NUREG-5512, Residual Radioactive Contamination From Decommissioning - Technical Basis for Translating Contamination to Annual Total Effective Dose Equivalent, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, October 1992

Appendix I

Background and Summary Information

This guidance was prepared in response to several memorandum and phone requests from the field. Ultimately, EH will be responding to these as part of the promulgation of 10 CFR Part 834, "Radiation Protection for the Public and Environment." However, due to the delay in issuing the final rule, we are issuing this interim guidance for continued implementation of DOE 5400.5 until the rule becomes effective.

The Department's current requirements call for the establishment of DOE approved authorized limits for release of property containing residual radioactive material. The principal DOE 5400.5 requirements for the establishment of release limits are that the releases subject to the authorized limits not cause members of the public to receive doses in excess of the dose limits provided in the Order and that any doses be maintained as low as practicable as determined by the As Low As Reasonably Achievable (ALARA) process. These authorized limits must also be appropriately coordinated with the Nuclear Regulatory Commission (NRC) and Agreement States to ensure they are consistent with commercial standards.

The order established a procedure for developing authorized limits for soil and guidelines for surface contamination. However, because the Department had no procedures or specific criteria for property having contamination in mass, Order DOE 5400.5 required EH-1 approval of any authorized limits established for radionuclide contamination in mass. This was done to ensure DOE-wide consistency and to ensure processes resulted in protective requirements. Since 1990, EH in coordination with EM have developed tools and criteria to assist the field in developing such limits. Working together, EH and the field have gained considerable experience in implementing the process. As a result, this guidance permits the field to approve authorized limits and releases that meet DOE 5400.5 requirements without written EH-1 concurrence if the following conditions are also met:

(1) Based on a realistic but reasonably conservative assessment of potential doses, it is demonstrated to the satisfaction of the responsible field office manager or the program office, that:

- , the release or releases of the subject material will not cause a maximum individual dose to a member of the public in excess of 1 mrem in a year or a collective dose of more than 10 person-rem in a year;
- , the releases and authorized limits will be appropriately documented; and

(2) A copy of the authorized limits, measurement/survey protocols and procedures, supporting documentation including a statement that the ALARA process requirements have been achieved, and appropriate material documenting any necessary coordination with the State(s) or NRC are provided to the Office of Environment, EH-4, at least 40 working days prior to the authorized limits becoming effective.

EH has worked with the field on several efforts to establish authorized limits for release of recyclable property and the disposal of slightly contaminated material in DOE on-site landfills. These activities have provided a high degree of public protection and produced significant cost savings. Examples include:

- Recycle of LBL Copper - Maximum dose to 0.15 mrem (less than 0.05% of the typical background dose and likely individual doses would be much less), collective dose 72 person-mrem, savings - \$247,000 plus a reduction in environmental impacts resulting from recycling.
- Authorized limits for commercial reuse of explosives from DOE Pantex facility - Maximum dose 0.005 mrem, collective dose $<2 \times 10^{-3}$ person-mrem, savings \$1,000,000 annually plus reduction in annual emissions associated with alternative disposal process.

- Disposal of roofing material in Hanford Central landfill - Maximum dose to the public 0.001 mrem per year, qualitative estimate of collective dose was a few person-mrem per a few hundred years - savings \$345,000.

This process does not establish a de minimis for radioactivity in that the release of these materials continue to be controlled by DOE field office personnel and will require their approval. It ensures protective and consistent application of the requirements by permitting the field offices authority to approve releases at very low doses. It provides EH time to intervene if a problem is identified. It permits establishment of a tracking system to allow EH to distribute useful information throughout the DOE complex and to provide better comments on related EPA efforts to developed national standards while reducing the review burden on the complex. It does not prohibit releases at protective but more cost-beneficial levels that are above the levels that the field may approve but instead, requires a greater level of review for such approvals. The process and requirements are consistent with Nuclear Regulatory Commission requirements and will be appropriately coordinated with external regulators. It will help streamline the regulatory function of the Department and reserve EH resources for only potentially higher risk issues.

In addition to the resources and cost savings associated with the revised process, a clear structured approach to control and release of material will result in improved environmental protection. The lack of adequate guidance and a clear process has been a root cause of previous incidents where DOE facilities have inappropriately released radioactive material. When consistent, clear and logical processes are not implemented, some facilities have developed their own procedures and policies that have resulted in inconsistent and undocumented releases. The guidance in this memorandum will further DOE efforts to resolve these problems and ensure that public protection is integrated into facility operations rather than addressed as an after thought.

APPENDIX B

Establishment and Coordination of Authorized Limits for Release of Hazardous Waste Containing Residual Radioactive Material

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United States Government**Department of Energy**

memorandum

DATE: JAN 07 1997

REPLY TO

ATTN OF: EM-37

SUBJECT: Establishment and Coordination of Authorized Limits for Release of Hazardous Waste
Containing Residual Radioactive Material

TO:

Distribution

The purpose of this memorandum is to update requirements and transmit guidance for establishing and coordinating authorized limits for release and off-site shipment of hazardous wastes containing residual radioactive material to facilities not licensed to handle radioactive materials. These updated requirements and associated guidance are applicable only to those sites that have lifted the hazardous waste moratorium and are operating in compliance with the "Performance Objective for Certification of Non-radioactive Hazardous Waste" issued by the Office of Waste Management (EM-30) on November 15, 1991 (revised February 17, 1995)." The updated requirements and guidance provide an alternative to the "no bulk or volume radioactive contamination added as a result of Department of Energy (DOE) operations" standard established under the Performance Objective.

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, issued on February 8, 1990, contains requirements for controlling and releasing wastes containing residual radioactive material. However, in 1991, Headquarters Environmental Management (EM) learned that past practices at several Field facilities had resulted in several incidents in which hazardous wastes containing slight concentrations of residual radioactive material were improperly released and shipped to commercial treatment, storage, and disposal (TSD) facilities which were not licensed to handle radioactive materials. In response, on May 17, 1991, EM-30 imposed a moratorium on the shipment to commercial facilities not licensed by the Nuclear Regulatory Commission (NRC) or an Agreement State of Resource Conservation and Recovery Act (RCRA)-hazardous wastes, Toxic Substances Control Act-regulated wastes and state hazardous wastes regulated under RCRA originating in a radiologically controlled area. DOE determined

that this action was necessary to ensure that DOE contractors were properly characterizing, labeling, and handling hazardous wastes.

On November 15, 1991, EM-30 established interim requirements for lifting the moratorium in the "Performance Objective for Certification of Non-Radioactive Hazardous Waste." Requirements included development, review and approval of site policies, criteria and procedures reflecting standards for unrestricted release of waste to off-site commercial TSD facilities not licensed to handle radioactive materials. The standards are: 1) compliance with DOE Order 5400.5 criteria for surface contamination, and 2) no bulk or volume radioactive contamination added as a result of DOE operations.

The Performance Objective was to remain in effect until DOE, in coordination with other Federal agencies, established risk-based numerical limits for release of wastes; once established, implementation of the numerical limits will be subject to individual state regulations.

DOE, with leadership from the Office of Environment, Safety and Health (EH), is continuing to work with other Federal agencies, including NRC and the Environmental Protection Agency, and coordinate with states to develop general radiological control criteria for certain waste streams. However, the schedule for establishing such standards is uncertain.

Since the moratorium, DOE has made substantial progress in establishing and implementing an effective program for managing wastes containing residual radioactive material. A recent audit by the Office of Inspector General concluded that, "DOE is establishing procedures to accurately and consistently distinguish between hazardous and mixed waste." (Memorandum from W. M. Costello, IG, to S. Cowan, "Audit of Department of Energy's Distinctions Between Hazardous Waste and Mixed Waste" dated July 5, 1996). To date, many DOE sites are operating in compliance with the Performance Objective and have fully or partially lifted the moratorium.

On November 17, 1995, EH issued interim guidance ("Application of DOE 5400.5 Requirements for Release and Control of Property Containing Residual Radioactive Material," memorandum from R. Pelletier to Distribution) which clarified DOE Order 5400.5 requirements as they apply to (among other things) the disposal of DOE waste into off-site landfills. The criteria and guidelines in the EH memorandum are also applicable to the shipment of hazardous waste to permitted treatment, storage, and disposal facilities. In issuing the guidance, EH concluded that since 1990, EH and EM have developed tools and criteria to assist the Field in developing limits for radionuclide contamination in mass, and EH and the Field have developed considerable experience in implementing the process. As a result, the EH guidance permitted the Field to approve authorized limits and releases that meet DOE Order 5400.5 requirements without written EH concurrence if certain conditions specified in the guidance were met. Among the conditions were a requirement that 1) the release limits and protocols comply with facility waste acceptance criteria and external applicable regulatory requirements for the facilities, and 2) that the limits be coordinated with, and acceptable to, facility operators and Federal, State, and Local regulators.

Although both the EH guidance and DOE Order 5400.5 require that releases be coordinated with and acceptable to TSD facility operators and regulators, they do not provide guidance on how such coordination should be accomplished. EM-30 has prepared the attached guidance package to meet this need and supplement DOE Order 5400.5, the EH guidance and other applicable requirements and guidance.

The moratorium has been partially or totally lifted at many DOE sites that have DOE approved programs in place that meet the Performance Objective. Shipments of waste materials consistent with the Performance Objective comply with DOE requirements and may continue. However, now that DOE has assurance that the sites which have lifted the moratorium in accordance with the Performance Objective have adequate programs in place to identify and manage waste, this memorandum now authorizes those sites to utilize DOE Order 5400.5 release requirements to establish authorized limits, on a case-by-case basis, which may differ from the "no bulk or volume radioactive contamination added as a result of DOE operations" interim standard established in the Performance Objective. Such limits must comply with DOE

Order 5400.5, and other applicable requirements (especially State and Federal waste regulations) and must be coordinated with and acceptable to Federal, State, and Local regulators and TSD facility operators. Such limits should also be consistent with EH and EM guidance. Prior to the establishment of such authorized release limits for off-site shipment of waste, appropriate policies, criteria, and procedures must be established and approved by the Operations or Field Office Manager.

Development, review, approval, and implementation of a program in accordance with the above specified requirements and guidance will ensure protection of public and worker health and safety, and the environment; ensure compliance with DOE, Federal, State, and local regulatory requirements and facility operator requirements; enhance cost-effectiveness; and expedite waste treatment and disposal.

Questions on this memorandum or attached guidance should be directed to the Office of Technical Services, EM-37, at (301) 903-7133.



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**Guidance on Establishment and Coordination of
Authorized Limits for Release of
Hazardous Waste Containing Residual
Radioactive Material**

January 1997

U. S. Department of Energy

Office of Environmental Management

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* To be provided in the future

**GUIDANCE ON ESTABLISHMENT AND COORDINATION OF AUTHORIZED
LIMITS FOR RELEASE OF HAZARDOUS WASTE
CONTAINING RESIDUAL RADIOACTIVE MATERIAL**

1.0 Objective

This guidance is provided to update and supplement guidance for establishing and coordinating authorized release limits for hazardous wastes containing residual radioactive material to ensure that all such releases meet applicable Federal, State, and local regulations and facility waste acceptance criteria (WAC). Procedures are provided to ensure that such releases are properly coordinated with, and acceptable to, regulators and operators of receiving facilities. Successful implementation of this guidance and other applicable requirements and guidance should prevent inappropriate releases while facilitating appropriate releases; thereby expediting treatment, storage, and disposal (TSD) of wastes in a safe and environmentally sound manner.

2.0 Scope

This document is applicable to the disposition of hazardous wastes that are subject to the "Performance Objective for Certification of Non-Radioactive Hazardous Waste" issued by the Office of Waste Management (EM-30) on November 15, 1991, and revised February 17, 1995, including Toxic Substances Control Act (TSCA) regulated waste, Resource Conservation and Recovery Act (RCRA) hazardous waste and state hazardous waste. This guidance supplements existing EH and EM guidance, it does not replace any existing guidance.

The guidance does not apply to the release of real property because neither the Hazardous Waste Moratorium nor the Performance Objective apply to the release of real property. The requirements for releasing real property, in lands and structures, are specifically documented in Chapter IV of Department of Energy (DOE) 5400.5 and additional guidance for applying the process is included in the "Manual for Implementing Residual Radioactive Material Guidelines

Using RESRAD, Version 5.0," ANL/EAD/LD-2, September 1993 and related materials (see Bibliography of Technical Resources). It is the responsibility of the DOE Field and, as appropriate, program offices to review and, where appropriate, approve measurement procedures and methodology and authorized limits for soils (lands) which meet DOE requirements for restricted or unrestricted use as specified in the Order and associated guidance.

Authorized Limits for release of real property are prepared by the Field Offices and are subject to the approval of the appropriate Headquarters program offices (see Chapter IV, Section 5a). No review by the Office of Environment, Safety and Health (EH) is required, because the establishment of the authorized limits follows a methodology already approved by EH. Even though this guidance, the EH November 1995 guidance, and the Performance Objective are not applicable to real property, some elements (such as thorough coordination with stakeholders, vendors, and regulatory officials) are entirely appropriate.

The discussion and analysis to follow is limited to radiological protection. All DOE facilities and operations must conform to applicable external regulatory requirements.

3.0 Background

DOE Order 5400.5, "Radiation Protection of the Public and Environment," issued February 8, 1990, established DOE requirements for control and release of waste containing residual radioactive material. It describes requirements under which DOE facilities may establish authorized limits for release of waste for off-site disposal. In the past, lack of adequate guidance and a clear process resulted in a number of incidents in which several DOE facilities improperly released and shipped hazardous waste containing slight concentrations of residual radioactive material to TSD facilities not licensed by the Nuclear Regulatory Commission (NRC) or Agreement States to handle radioactive materials (hereafter referred to as "unlicensed facilities"). In response to these incidents, in 1991, EM-30 issued a moratorium on the shipment of Resource Conservation and Recovery Act (RCRA) hazardous wastes and Toxic Substances Control Act (TSCA) wastes originating in radiologically controlled areas to

such unlicensed facilities⁽³⁾. The Department determined that this action was necessary to provide DOE assurance that DOE contractor operations were appropriately characterizing, labeling, and handling hazardous wastes. The moratorium was to remain in effect at each DOE facility until such time as the DOE operation demonstrated that it was implementing management programs consistent with the EM-30 "Performance Objective for Certification of Non-Radioactive Hazardous Waste,"⁽⁴⁾ i.e., "To assure that RCRA-hazardous, State-hazardous and TSCA-regulated wastes shipped from DOE facilities to commercial TSD facilities have no bulk or volume radioactive contamination added as a result of DOE operations (emphasis added) and are in compliance with DOE Order 5400.5 criteria for surface contamination unless the receiving facility is specifically licensed to manage radioactive waste." The EM-30 Performance Objective, which was to provide interim requirements for determining whether RCRA and TSCA wastes were radioactive, was to remain in effect until the Department, in coordination with other Federal agencies, established risk-based numerical limits for release of waste. Once established, implementation of numerical limits will be subject to individual State regulations.

DOE is continuing to work with other Federal agencies including the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC), and coordinate with states, to establish general radiological control criteria for hazardous wastes. Although a schedule for implementing such generally applicable standards has not been determined, DOE will continue to work with other Federal agencies and the states to establish risk-based criteria as soon as possible.

Since 1991, the Department has made very substantial progress in establishing and implementing an effective program for managing hazardous wastes containing residual radioactive material. Many DOE sites are operating in compliance with the Performance Objective and have totally or partially lifted the moratorium. On March 16, 1995, the Deputy Assistant Secretary for Waste Management (DAS/WM) delegated authority for lifting the moratorium to the Operations Offices⁽⁵⁾. A recent audit by the DOE Office of Inspector General concluded that, "the Department is establishing procedures to accurately and consistently distinguish between hazardous and mixed waste."⁽⁶⁾

On November 17, 1995, the Office of Environment, Safety, and Health (EH) issued interim guidance, which provided clarification of DOE Order 5400.5 requirements as they apply to (among other things) the disposal of DOE non-hazardous waste into off-site landfills. The criteria and guidelines contained in the EH guidance may also be used for the release and shipment of hazardous waste to permitted TSD facilities. In issuing this guidance, the DOE Office of Environmental Policy and Assistance (EH-41), concluded that since 1990, EH and EM have developed tools and criteria to assist the Field in developing authorized limits for contamination in mass, and EH and the Field have gained considerable experience in implementing the process. As a result the EH guidance permits the Field to approve, without written EH-1 approval, authorized limits and releases that meet DOE Order 5400.5 requirements and other requirements specified in the guidance. EH-41 noted that similar joint EH/Field efforts to establish authorized limits for recyclable property and disposal of slightly contaminated material in onsite DOE landfills has provided a high degree of public protection and significant cost savings. The one critical area in which DOE has not provided specific guidance is in coordinating with, and obtaining acceptance of, commercial TSD regulators and operators that release limits and protocols comply with requirements of TSD facility regulators and operators. DOE policy does not permit the release of wastes containing residual radioactive material if release of the waste would violate other applicable Federal, State, or local regulations, even if the waste meets DOE dose limits and the authorized limits are consistent with as low as reasonably achievable (ALARA) criteria. DOE Order 5400.5 requires that authorized limits "shall be consistent with limits and guidelines established by other applicable Federal and State laws." The 1995 EH guidance specifies that authorized limits and release protocol must meet facility WAC and state requirements for the subject facilities. The guidance further specifies that authorized limits should be coordinated with, and acceptable to, the facility operator and State regulators to ensure that DOE releases do not violate facility specific radiological protection requirements.

Although the Order, EH guidance, and the moratorium Performance Objective require that authorized release limits comply with Federal, State and local regulations and be coordinated with, and acceptable to, facility operators and regulators, they provide little specific guidance

on meeting these requirements. The guidance contained in the following sections of this document is intended to fill that gap.

The moratorium on shipment of hazardous waste to unlicensed disposal facilities has been lifted at many facilities that meet the Performance Objective. Shipments of hazardous wastes consistent with the Performance Objective are in compliance with DOE requirements and may continue on that basis. Because DOE has assurance that the sites which have lifted the moratorium in accordance with the Performance Objective have adequate programs in place to identify and manage waste, EM-30 issued a memorandum⁽⁷⁾ which authorized those sites to utilize the DOE 5400.5 release requirements to establish authorized limits, on a case-by-case basis, that may differ from the “no bulk or volume radioactive contamination added as a result of DOE operations” standard. Such limits must comply with requirements of DOE 5400.5⁽¹⁾ and be consistent with the EH 1995 guidance⁽²⁾, the EM-30 guidance contained in this document, and other applicable requirements and guidance. Prior to establishment of authorized release limits or release of waste that meet those limits, appropriate policies, procedures, and criteria must be established and approved by the appropriate Operations Office Manager or Field Office Manager.

This action is consistent with the revised process which EH established through its 1995⁽²⁾ guidance and about which it concluded the following:

- it does not establish a de minimis for radioactivity in that the releases of these materials will continue to be controlled by DOE Field Office personnel and will require their approval;
- it ensures protective and consistent application of the requirements by permitting the Field Offices authority to approve releases at very low doses;
- it provides EH time to intervene if a problem is identified;
- it is consistent with NRC requirements and will be appropriately coordinated with external regulators;

- in addition to the resource- and cost-savings associated with the revised process, a clear structured approach to control and release of material will result in improved environmental protection; and
- it will help ensure that public protection is integrated into facility operations rather than addressed as an afterthought.

Development, review, approval, and implementation of a compliant and effective program in accordance with the above-specified guidance will ensure protection of public and worker health and safety and the environment; ensure compliance with DOE, Federal, State and local regulatory requirements and facility operator requirements; streamline procedures; expedite waste shipments to TSD facilities; and enhance waste management cost-effectiveness.

4.0 Requirements (Criteria for Release of Hazardous Wastes to TSD Facilities)

The guidance presented in this document is applicable only to off-site release of hazardous wastes containing residual radioactive material. On-site disposal of wastes shall continue to be performed in accordance with existing requirements and guidance.

In accordance with EH guidance⁽²⁾ DOE may establish and approve authorized limits and associated survey and protocol for release of wastes to TSD facilities (not licensed to handle radioactive materials) if:

1. The authorized limits are selected and approved by DOE on the basis of an assessment under the ALARA process to optimize the balance between risks and benefits including costs and collective doses and to ensure that individual doses to the public are less than 25 millirem in a year with a goal of a few millirem in a year or less.
2. The authorized limits are evaluated to ensure that ground water will be protected in a manner consistent with the objectives of the applicable State regulations and guidelines.

3. The authorized limits are assessed to ensure that release of the disposal facility property would not be expected to require remediation under DOE 5400.5 requirements or other applicable requirements for release of property containing residual radioactive material as a result of DOE disposals.
4. The authorized limits and planned releases are coordinated with and acceptable to operators implementing facility waste acceptance criteria and State representatives responsible for implementing waste regulations to ensure that DOE releases do not violate TSD facility-specific radiological protection requirements.

4.1 Dose Assessments and ALARA Evaluations

Dose assessments for TSD facilities should include consideration of all significant pathways of exposure for likely or reasonably expected uses of the TSD facilities after closure as well as doses to workers during operation of the TSD facilities. Potential doses to workers conducting corrective actions at the disposal site should be considered.

The assessment of potential groundwater impacts may give consideration to site-specific controls in place to maintain the long-term integrity of the disposal site if the authorized limits are developed for disposal at a specific site. However, if the authorized limits are being developed to permit disposal to a number of potential sites, the assessment should be sufficiently conservative so as not to underestimate dose.

In general, the evaluations required to meet the requirements of items 1 and 2 of Section 4.0 will provide reasonable assurance that the requirements of item 3 (Section 4.0) are also met. However, in addition to assessing doses under actual and likely use and demonstrating that these doses will be as far below 25 mrem in a year as is practicable (the goal being a few mrem or less), DOE requires that released wastes be evaluated to ensure that worst plausible doses will not exceed the 100 mrem in a year primary dose limit. To provide a reasonable expectation that this requirement will be met, the analysis should consider potential exposures to intruders of a disposal site should restrictions fail.

Other useful guidance or tools to assist facilities in developing acceptable authorized limits are included in the attached Bibliography of Technical Resources.

4.2 DOE Approval of Authorized Limits

In accordance with DOE Order 5400.5 requirements, authorized limits (and associated characterization procedures and protocols) for the release of hazardous waste having residual radioactive material distributed throughout the volume or in mass must be approved by the DOE Office of Environment, Safety and Health (EH-1) in addition to responsible DOE Field or Program Offices. However, consistent with the EH November 17, 1995, guidance, authorized limits and characterization protocols for residual radioactive material in volume may be approved by DOE Field Office managers without EH-1 written approval if the following conditions are met:

1. DOE Order 5400.5 requirements are met;
2. Based on a realistic but reasonably conservative assessment of potential doses, it is demonstrated to the satisfaction of the responsible Field Office Manager that:
 - C the release or releases of the subject material will not cause a maximum individual dose to a member of the public in excess of 1 mrem in a year or a collective dose of more than 10 person-rem in a year; and
 - C A procedure is in place to maintain records of the releases consistent with the DOE 5400.5 requirements and that survey or measurement results are reported consistent with the data reporting guidelines in the DOE November 1992 radiological survey guidance and DOE/EH-173T; and
3. A copy of the authorized limits, measurement/survey protocols and procedures, supporting documentation including a statement that the ALARA process requirements have been achieved, and appropriate material documenting any necessary coordination

with the state(s) or NRC are provided to the Office of Environment, EH-4, at least 40 working days prior to the authorized limits becoming effective. EH will provide written notification of receipt of the material. Unless EH-4 notifies the Field or Program Office of problems within 20 working days of receipt, the authorized limits may be considered approved by EH. Authorized limits that do not meet the Field approval criteria stated above must be approved by EH-1. It is recommended that the analysis be coordinated with EH-412, the Air, Water, and Radiation Division prior to submitting the request for approval to EH-1.

5.0 Guidance for Coordination and External Requirements

TSD facilities have waste acceptance criteria (WAC) and are subject to State and local requirements on radioactive materials. In addition to meeting DOE requirements, DOE-established authorized radiological limits and release protocols must be consistent with the WAC, and Federal, State and local requirements for these TSD facilities. DOE must ensure that the authorized limits are coordinated with, and acceptable to, the TSD facility operator implementing the WAC and Federal, State, and local representatives responsible for implementing waste regulations to ensure that DOE releases do not violate facility-specific radiological protection requirements. DOE must also ensure that releases do not violate U.S. Nuclear Regulatory Commission (NRC) licensing requirements by coordinating with the appropriate Agreement State representative or, where appropriate, with the NRC.

5.1 The Coordination Process

A key to successful coordination and agreement with Federal, State, and local regulators and commercial facility operators is the early involvement of all parties. It is recommended that DOE sites perform preliminary or screening ALARA evaluations and dose assessments to assess the viability of releasing the waste in accordance with DOE requirements prior to approaching external regulators or disposal facility operators. If the results of the preliminary assessments indicate that release is feasible, it is recommended that the site contact TSD

facility regulators and operators prior to conduct of detailed ALARA and dose assessments to allow incorporation of operator and regulator requirements, if any, into the detailed analyses.

5.2 Coordination with TSD Regulators

A number of states have expressed interest in being involved at the start of the process in which a DOE site is considering the release of wastes for shipment to commercial TSD facilities not licensed to handle radioactive wastes. Early involvement of state regulators in the evaluations and analyses supporting development of DOE authorized limits should foster development of a good working relationship between DOE and the states and facilitate efforts to establish mutually acceptable limits.

A listing of state agencies to be contacted is provided in Appendix I (State Contacts). It must be noted that the listing may not be complete and may change through time. It should also be noted that other Federal, State, and local agencies, such as those responsible for air and water quality, may also have regulatory authority and may have to be included in the coordination process.

It is necessary to obtain the States's agreement with any DOE determination that the material can be accepted by the facility. The exact form of this agreement (approval/acceptance/concurrence, etc.) will likely vary from state to state and with the involved regulatory agency within the state.

A summary of specific state information pertinent to dealing with regulators in a given state is presented in Appendix II (State Requirements and Guidance for Acceptance). Information on state requirements and necessary interactions with regulators is included. The information provided in this appendix should be used with caution as it may not be complete; current information for any state should be obtained directly from the state.

5.3 Coordination with the Receiving Facility

Acceptance by Federal, State, and local authorities does not necessarily ensure acceptance by the commercial facility operator. Consequently, the commercial facility should be contacted at the same time as the appropriate regulatory authorities. A number of facilities have indicated a willingness to handle wastes containing residual radioactive material if the regulators having jurisdiction over their operating licenses/permits would agree to allow the facilities to accept the waste.

Commercial facilities operate under licenses and permits issued by a number of Federal, State, and local authorities. Every TSD facility has defined WAC that govern the characteristics of the hazardous waste to be accepted for disposal at the site. The WAC are based upon criteria imposed by the regulators as a condition of granting the site operating permits. In particular, under existing licenses/permits/WAC, wastes containing radioactive material is generally not accepted at commercial facilities that are not specifically licensed to handle radioactive material. Waste should be sent only to appropriately licensed/permitted facilities that are EPA or State approved and are in compliance with all applicable requirements. Once all approvals are obtained indicating that the waste can be accepted, it can then be classified and handled based upon its other characteristics, e.g., hazardous or sanitary.

6.0 Documentation

Appropriate documentation must be retained to provide a clear record of the coordination between all parties involved, all agreements/approvals/ concurrences received, and related ALARA evaluations and dose assessments. This documentation should include: DOE site and/or EH headquarters approvals of authorized limits, Field procedures and protocols associated with the authorized limits, documentation of regulatory agency coordination and acceptance similar communications from the facility that will receive the wastes, all related analyses, and such other related documents which will clearly establish that all parties fully understand the actions proposed and that the actions may proceed.

7.0 Submittal of Lessons Learned

Lessons learned from each experience with the guidance should be documented and forwarded to the address below so that they may be shared with other DOE waste managers.

Office of Technical Services (EM-37)
Office of Waste Management
Environmental Management
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290
Telephone - (301) 903-7133

8.0 Summary

This document provides guidance to assist DOE waste managers in coordinating with and obtaining agreement of Federal, State, and local regulatory agencies, and operators of TSD facilities, to permit the shipment of hazardous wastes containing residual radioactive materials to a commercial treatment, storage, and/or disposal facility not licensed to handle radioactive materials. The guidance is intended to supplement existing guidance on release of waste containing residual radioactive materials and to assist in improving communications among DOE, Federal, State, and local regulatory authorities and commercial facility operators.

References

1. DOE Order 5400.5, *Radiation Protection of the Public and Environment*. U.S. Department of Energy, Feb. 8, 1990, Revised January 7, 1993 (change 2).
2. Pelletier, R. F., *Application of DOE 5400.5 Requirement for Release and Control of Property Containing Residual Radioactive Material*. Memorandum, U.S. Department of Energy, Washington D.C., November 17, 1995.
3. Lytle, J. E., *Shipment of Waste Originating in Radiation Control Areas*. Memorandum, U.S. Department of Energy, Washington, D.C., May 17, 1991.
4. *Performance Objective for Certification of Non-Radioactive Hazardous Waste*. Office of Waste Management, Office of Environmental Management, U.S. Department of Energy, Washington, D.C., November 15, 1991 (Revision 1, February 17, 1995).
5. Lytle, J. E., *Delegation of Authority for Lifting the Non-Radioactive Hazardous Waste Shipment Moratorium*. Memorandum, U.S. Department of Energy, Washington, D.C., March 16, 1995.
6. Costello, W. J., *Audit of the DOE's Distinctions Between Hazardous Waste and Mixed Waste, Audit Report No. ER-L-96-07*, U.S. Department of Energy, Washington, D.C., July 5, 1996.
7. Frei, M. W., *Establishment and Coordination of Authorized Limits for Release of Hazardous Waste Containing Residual Radioactive Material*, Memorandum, U.S. Department of Energy, Washington, D.C., January 1997.

Bibliography of Technical Resources

ALARA:

R. Pelletier, EH-41, *DOE Guidance on the Procedures in Applying the ALARA Process for Compliance with DOE 5400.5*, Memorandum, Department of Energy, Office of Environmental Guidance, March 8, 1991.

ANL/EAD/LD-2, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD*, Version 5.0, Chapters 1 and 5 and App. M, September 1993.

Measurement and Data Reporting:

DOE Manual for Use and Comment, *Environmental Implementation Guide for Radiological Survey Procedures*, Department of Energy, Office of Environmental Guidance, November 1992.

DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*, Department of Energy, January 1991.

NUREG/CR-5849, *Manual for Conducting Radiological Surveys in Support of License Termination*, U.S. Nuclear Regulatory Commission, June 1992.

NUREG-1505, *Draft Report, A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys*, U.S. Nuclear Regulatory Commission, August 1995.

NUREG-1506, *Draft Report, Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria*, U.S. Nuclear Regulatory Commission, August 1995.

Dose Factors:

EPA-520-1-88-020, *Federal Guidance Report No. 11, Limiting Radionuclide Intake and Air Concentrations and Dose Conversion Factors for Inhalation, Submersion and Ingestion*, Environmental Protection Agency, September 1988.

EPA 402-R-93-081, *Federal Guidance Report No. 12, External Exposure to Radionuclides in Air, Water and Soil*, Environmental Protection Agency, September 1993.

Tools for Dose Assessment:

ANL/EAD/LD-2, *Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0*, Published by Argonne National Laboratory and prepared by ANL and DOE staff, September 1993.

ANL/EAIS-8, *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil*, Argonne National Laboratory, April 1993.

ANL/EAIS/TM-103, *A Compilation of Radionuclide Transfer Factors for Plant, Meat, Milk and Aquatic Food Pathways and Suggested Default Values for the RESRAD Code*, Argonne National Laboratory, August 1993.

PNL-9405/UC-610, *Radiation Dose Assessment Methodology and Preliminary Dose Estimates to Support U.S. Department of Energy Radiation Control Criteria for Regulated Treatment and Disposal of Hazardous Waste and Materials*. Battelle, July 1995.

PNL-8724, *Radiation Dose Assessments to Support Evaluations of Radiological Control Levels for Recycling or Reuse of Material and Equipment*, Pacific Northwest Laboratory, July 1995.

ANL/EAD.LD-3, *RESRAD-Build: A Computer Model for Analyzing the Radiological Doses Resulting from the Remediation and Occupancy of Buildings Contaminated with Radioactive Material*, Argonne National Laboratory, November 1994.

NUREG-1500, *Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC's Staff's Draft for Comment*, U.S. Nuclear Regulatory Commission, August 1994.

NUREG-5512, *Residual Radioactive Contamination From Decommissioning - Technical Basis for Translating Contamination to Annual Total Effective Dose Equivalent*, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, October 1992.

Surface Guidelines:

NRC publication, *Guidelines for Decontamination and Decommissioning of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material*, U.S. Nuclear Regulatory Commission, July 1984.

NRC Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, U.S. Nuclear Regulatory Commission, June 1976.

DOE/CH-8901, *Manual for Implementing Residual Radioactive Material Guidelines - A Supplement to the U.S. Department of Energy Guidelines for Residual Radioactive Material at FUSRAP and SFMP Sites*, Department of Energy, June 1989.

DOE Guidance Memorandum, *"Unrestricted Release of Radioactively Contaminated Personal Property,"* J. Maher, DOE Office of Nuclear Safety, March 15, 1984.

DOE Committee Report, *Recommended Tritium Surface Contamination Release Guides*, DOE Tritium Surface Contamination Limits Committee, February 1991.

NOTE: The Appendices listed below, which were included with the original EM-30 guidance document, are not included in this reproduction. The information in Appendices I and II may no longer be current, and Appendix III was never issued.

APPENDIX I - State Contacts

APPENDIX II - State Requirements and Guidance for Acceptance

APPENDIX III - Case Examples

APPENDIX C

Performance Objective for Certification of Non-Hazardous Waste

NOTE: This document has been electronically reproduced by scanning a copy of the original. The reader should be aware that page numbers as referred to in the text may not correctly correspond with the actual page numbers due to differences between the wordprocessing software used to produce the original and the wordprocessing software used to produce the document presented in this appendix. The reader is encouraged to obtain a complete copy of the original EM guidance from the Office of Technical Services (EM-37) of the Department of Energy Office of Waste Management.

**PERFORMANCE OBJECTIVE
FOR
CERTIFICATION OF
NON-RADIOACTIVE HAZARDOUS WASTE**

**OFFICE OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WASTE MANAGEMENT (EM-30)**

Approved by:


Deputy Assistant Secretary for
Waste Management. EM-30

Date:

2/17/99

PERFORMANCE OBJECTIVE
FOR
CERTIFICATION OF
NON-RADIOACTIVE HAZARDOUS WASTE

PERFORMANCE OBJECTIVE: To assure that RCRA-hazardous, state-hazardous and TSCA-regulated wastes shipped from DOE facilities to commercial treatment, storage or disposal facilities have no bulk or volume radioactive contamination added as a result of DOE operations and are in compliance with DOE Order 5400.5 criteria for surface contamination unless the receiving facility is specifically licensed to manage radioactive waste.

1.0 Purpose

The Performance Objective contained herein is to provide interim requirements for determining whether a Resource Conservation and Recovery Act (RCRA)-hazardous, state-hazardous or Toxic Substances Control Act (TSCA)-regulated waste is radioactive. These interim requirements are predicated on Department of Energy (DOE) activities adding no measurable radioactivity, within statistical limits, in bulk to a material which is being declared a waste and meeting the DOE Order 5400.5 surface contamination guidelines. This determination is necessary before a waste can be transported offsite for treatment or disposal at non-DOE owned facilities not licensed for management of radioactive materials.

The Department is actively working on limits for levels of radioactivity that can be safely released for treatment or disposal. This Performance Objective is to remain in effect until the Department, in coordination with other federal agencies, establishes risk-based numerical limits for release of waste. Once established, implementation of numerical limits will be subject to individual state regulations.

2.0 Background

Misapplication of DOE Order requirements regarding processes for acquiring approval of release criteria and the absence of a Federally established “de minimis” level of radioactivity in wastes have resulted in the use of inconsistent criteria and methods for making decisions on the release of waste from DOE sites. Sites have individually established release criteria based on the inappropriate application of standards found in DOE Orders, Department of Transportation (DOT) regulations, Nuclear Regulatory Commission (NRC) regulations and guidance, or a combination thereof. The lack of clear guidance has created a situation in which slightly radioactive waste could be released to treatment or disposal facilities which are not licensed for management of radioactive materials. As a result, the Office of Environmental Management imposed a moratorium on the offsite shipment of hazardous waste, potentially contaminated with radioactivity, until such time as site criteria and procedures for meeting this performance objective could be evaluated and approved.

A site-by-site evaluation of policies; criteria and procedures relative to this Performance Objective will be conducted by the Office of Waste Management (EM-30) or by the Operations Office upon delegation by EM-30. The evaluation will be performed in two (2) phases as follows:

1. Review and approval of site policies, criteria and procedures reflecting standards for unrestricted release of waste to off-site commercial treatment, storage, and disposal (TSD) facilities. The standards are: compliance with the surface contamination guidelines of DOE Order 5400.5; and no measurable increase in radioactivity in the volume of a waste.
2. Audit of site implementation of the criteria and procedures required by this Performance Objective.

The first phase of the evaluation will be conducted prior to the lifting of the moratorium for any particular site. Lifting the moratorium for any site will be predicated upon approval by the Deputy Assistant Secretary for Waste Management (EM-30) or an authority designated by EM-30.

Phase 2 will begin a process of routine verification by DOE and contractor line management of the effective implementation of these standards and procedures.

3.0 References

This Performance Objective was developed with the following DOE Orders as references: 5400.5, "Radiation Protection of the Public and the Environment;" 5480.11, "Radiation Protection for Occupational Workers;" 5820 2A, "Radioactive Waste Management;" 5700.6C, "Quality Assurance." Other references include American Society of Mechanical Engineers (ASME) NQA-1-1989, "Quality Assurance Program Requirements for Nuclear Facilities;" the DOE Environmental Guidance Program Reference Book "Atomic Energy Act and Related Legislation;" DOE N 5480.6 (now DOE/EH-0256T, Rev.1), "DOE Radiological Control Manual," and consultation with representatives of EH-23, Office of Environmental Guidance.

4.0 Definitions

A review of the definitions in the above-referenced Orders resulted in the conclusion that new or improved definitions were needed to cover the unrestricted release of RCRA-hazardous, state-hazardous and TSCA-regulated waste to commercial TSDs. Therefore, to facilitate implementation of this Performance Objective, new or revised definitions are provided in the following sections.

4.1 Radioactive Waste: A radioactive waste is any waste managed for its radioactive content which is not otherwise regulated for that radioactive content (e.g., regulated by Clean Air Act, etc.). If a material was received as nonradioactive, any resulting waste is not a radioactive waste if it meets the following conditions:

1. Contains no measurable increase in radioactivity (at a statistically defined confidence interval) above background in volume or bulk resulting from DOE Operations except for wastes specifically exempted or excepted by the Environmental Protection Agency (EPA), DOE, or NRC regulations (e.g., 10 CFR 20.2005); and
2. Complies with the surface contamination requirements established in DOE Order 5400.5, II.5.c.(1).

4.2 Mixed Waste - Mixed waste is radioactive waste which is also regulated under Subtitle C of RCRA. Note: Radioactive state-hazardous and TSCA-regulated waste, although not technically mixed waste, is also subject to the requirements specified in this Performance Objective.

4.3 Radioactive Materials Management Area - A Radioactive Materials Management Area (RMMA) is an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area that is exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation. Accident or variant conditions may require areas to be designated as temporary RMMAs until conditions are corrected. The delineation of RMMAs is a complex technical process which is central to the management of waste at DOE facilities where radioactive materials are present. Detailed guidance is provided in Attachment A of this Performance Objective.

4.4 Unrestricted Release - Unrestricted release is the release of property (e.g., waste), based on a formal, documented decision that the property may be utilized, treated, or disposed of by any party without concern for radioactive content.

5.0 Basic Principles

The definition for mixed waste provided above is consistent with the intent of the definition in DOE Order 5820.2A. Similarly, the definition of radioactive waste provided above is also consistent with the intent of the definitions in DOE Order 5820.2A. There are no generic “below regulatory concern” or “de minimis” tests for defining radioactive material.

Therefore, the basic principle effected by this Performance Objective is that no mixed waste, as defined above, is to be shipped offsite to a facility not specifically licensed for the receipt of the radioactive component of the waste.

When a waste is potentially a mixed waste, there are three possible cases for disposition:

- Case 1 the waste is determined to be a hazardous waste only and is shipped offsite for treatment and disposal; and
- Case 2 the waste is determined to be a mixed waste and is managed, treated, and disposed of at DOE facilities; and
- Case 3 the waste is determined to be a mixed waste and is shipped to NRC or Agreement State-licensed, RCRA-permitted offsite commercial facility for treatment, then the radioactive residue is disposed of in a licensed (and permitted, if required) commercial disposal facility or returned to DOE for treatment/disposal.

Note: All mixed waste is radioactive waste by definition. DOE Order 5820.2A specifies the management and disposal of all radioactive waste: high-level waste is to be stored, treated, then disposed of in the National Repository; defense transuranic waste is to be disposed of at the Waste Isolation Pilot Plant; and low-level waste (the main concern of this Performance Objective) is to be disposed of "... on the site where it is generated, if practical, or if on-site disposal capability is not available, at another DOE disposal facility."

Thus for the first case, the certification that no radioactive waste is present is all that is necessary. Further management is defined by the regulations of RCRA. The criteria and procedures for declaring that a waste is not radioactive are the principles focused on in this Performance Objective.

For the second case, a determination that the waste is a mixed waste is all that is necessary. Subsequent management is defined by the referenced Orders and regulations. Mixed waste managed on-site or at another DOE facility is not discussed any further in this Performance Objective.

For the third case, shipment of mixed waste to an NRC or Agreement State-licensed, RCRA-permitted, offsite commercial treatment/disposal facility does not constitute unrestricted release. Compliance with requirements in existing Orders (Order 5820.2A) and applicable state regulations is necessary. Formal verification of the permit and license status of the receiving facility must be documented and clearly traceable to the waste shipment.

Basically, the site shall have formal documented procedures addressing the decisions and management of waste via the three cases summarized above. However, the emphasis of this Performance Objective is on the first and third cases for DOE-regulated materials.

6.0 Determining Radioactivity Status of Wastes

A site's criteria and procedures for demonstrating compliance with this Performance Objective must be aimed at determining if there is a measurable increase in radioactivity above background from DOE operations. This may be done by either process knowledge, surface contamination surveys, or sampling and analysis (radioassay), or by a combination of these techniques. The method(s) used is dependent on the source of waste, type of waste (e.g., solid or liquid) and the nuclides potentially present.

6.1 Radioactive Materials Management Area - A key aspect to management of potentially radioactive waste is the establishment of radioactive materials management areas (RMMAs) as defined in this Performance Objective. Operating procedures must specify the identification of the physical boundaries of areas qualifying as RMMAs. Any waste streams exiting an RMMA would be considered to be potentially contaminated.

The boundaries of an RMMA may coincide with the site's Controlled Areas as defined in DOE Order 5480.11 or with Radiological Buffer Areas as defined in the "Radiological Control Manual." It is important to note that no decision regarding potential for contamination may be based solely on the waste coming from outside a radiological area as defined by DOE Order 5480.11. Because the definition of a radiological area is based on threshold values for dose; air concentration, or surface contamination level, it is not appropriate for making decisions which involve no threshold levels of contamination (i.e., the DOE 5400.5 definition of "Potential for Contamination" and the definition of an RMMA).

Radiological Areas, as defined in DOE Order 5480.11 may be, but are not necessarily, RMMAs. For example, a radiological area established because of the dose rate, but with no potential for contamination may not have to be an RMMA.

The delineation of RMMAs is a complex technical process which is central to the management of waste at DOE facilities where radioactive materials are present. Detailed guidance is provided in Attachment A of this Performance Objective.

6.2 Process Knowledge - An understanding of the process generating a waste and the subsequent management of the waste may be used alone or in conjunction with another method in determining whether a waste is a radioactive waste.

If a waste is known to be from outside of a RMMA, the waste can be classified as non-radioactive. If a waste comes from inside an established RMMA, process knowledge may still be used in determining that the waste is non-radioactive. An example would be a sealed container of material which was never opened while in an RMMA and was not exposed to a source of activation. In this example, process knowledge can be used to certify that the waste is not contaminated in volume, and the waste can be released as non-radioactive if the container meets the surface release criteria contained in DOE Order 5400.5.

Procedures shall specify that the decision, and the rationale for the decision, that a waste is or is not potentially radioactively contaminated must be documented, certified, and in a readily retrievable form traceable to the waste container. For potentially contaminated wastes, process knowledge-based determinations of "radioactively contaminated" or "not radioactively contaminated" shall be similarly documented and certified. These certifications shall be made by individuals qualified by training and or cognizant of the origin, use, and potential for exposure of the waste in question. Each certification shall be traceable to the documented rationale for the decision that no radioactive waste is present.

Waste from inside RMMAs, which cannot be definitively declared radioactive or non-radioactive by process knowledge, must be considered potentially contaminated. The radioactive status must be established by appropriate survey and/or sampling and analysis. Process knowledge may be useful in limiting the range of radionuclides for which one must survey or analyze.

6.3 Surface Contamination Surveys - Use of surface contamination surveys must be limited to making decisions regarding the surface contamination of a material; generally, surface contamination surveys are not appropriate for making decisions on the absence of radioactive materials in waste that is potentially volume contaminated. Assessment of surface contamination must include a sufficient number of survey points to characterize the radiological condition of the surface of the waste, container, or both.

Surface contamination surveys, and the appropriate ALARA analyses, may be used for determining compliance with the surface contamination guidelines of DOE Order 5400.5, Figure IV-1. The guidelines in Figure IV-1 are augmented by the following:

Allowable Total Residual Surface Contamination (dpm/100 cm ²)			
Radionuclides	Average	Maximum	Removable
Transuramics, I-125, I-129, Ra-226, Ra-228, Th-228, Th-230, Ac-227, Pa-231	100	300	20
Reference: Memorandum, J.R. Maher to J.R. Beers, et al., "Unrestricted Release of Radioactively Contaminated Personal Property," dated May 15, 1984			

The process for conducting the surveys, and for documenting the results shall be specified in formal, documented procedures which include:

- survey procedures, survey instruments, survey parameters, survey techniques;
- criteria for determination of surface contamination;
- instrument detection sensitivity, detection limits for nuclides of concern and calibration requirements; and
- procedures for determining background and adjusting survey data accordingly.

All procedures shall be appropriate for the radionuclides and matrices to be analyzed. The radionuclides of concern shall be part of the decision process for selecting the appropriate detection techniques and instruments.

Survey techniques and instrumentation shall be representative of up-to-date technologies. Extraordinary techniques, such as counting samples in a radiation

detector for unreasonably extended periods, are not required, as long as appropriate and necessary detection limits are achieved.

If individual items determined to be acceptable for release in accordance with the criteria for surface contamination in DOE ; Order 5400.5 are composited in a container, the container will not be considered to be bulk contaminated.

Radiation survey results shall be recorded as prescribed in the "Radiological Control Manual," DOE/EH-0256T, Rev 1. A certification that no radioactive waste is present shall be provided and documented similar to that described for process knowledge-based decisions and shall reference and be traceable from the waste shipment to the survey/analytical data. All data supporting a determination that a waste is not a radioactive waste shall be documented in a readily retrievable form.

6.4 Sampling and Analysis - When a reasonable potential for volume contamination of the waste exists, and cannot be adequately resolved by process knowledge, certification of the absence of radioactive contamination must be based on radiological survey and/or sampling and analytical data. The process for conducting sampling and analysis, and for documenting the results shall be specified in formal documented procedures which include:

- guidelines for developing sampling criteria and procedures;
- statistical basis for sample frequency, definition of allowable error and specification of confidence interval;
- instrument detection-sensitivity, detection limits for nuclides of concern and calibration requirements;
- procedures for determining background (including naturally occurring radioactive material) and adjusting radioassay data accordingly; and

- description and justification for the criteria (L_C or L_D) used for determining if DOE radioactivity has been added to the volume of waste.

All procedures shall be appropriate for the radionuclides and matrices to be analyzed. The radionuclides of concern shall be part of the decision process for selecting the appropriate detection techniques and instruments. Radioassay techniques can be used for determining a waste is not radioactive only if they can be reasonably expected to distinguish DOE-added radioactivity from radioactivity in a virgin sample of the material being assayed.

Radioassay techniques and instrumentation shall be representative of reasonably available, up-to-date technologies. Extraordinary techniques; such as counting samples in a radiation detector for unreasonably extended periods, are not required, as long as appropriate and necessary detection limits are achieved.

Examples of acceptable methods for demonstrating that no radioactivity has been added and, therefore, a waste is not a radioactive waste, include:

- comparing analytical results for the potentially radioactive waste to results for the same or comparable material as it is received by the site;
- for potentially radioactive soils, comparing analytical results for the suspect soil to analytical results of native soils from areas outside of RMMAs;
- comparing analytical results to a background measurement with no sample present.

In all cases, the sampling and analyses should be based on accepted practices (accepted practices include, but are not limited to, the following: SW-846, "Test Method for the Evaluation of Solid Waste, Physical/Chemical Methods;" those

listed in Appendix D of the DOE Survey Manual; EPA's Environmental Monitoring Systems Laboratory (EMSL), Las Vegas, Nevada; DOE's Environmental Measurements Laboratory (EML), Long Island, New York; EPA's Eastern Environmental Radiation Facility (EERF) Radiochemistry Procedures Manual guidance; and the Environmental Radiation Ambient Monitoring System (ERAM) Manual. Valid statistical methods providing a defined confidence level should be employed.

A certification that no radioactive waste is present shall be provided and documented similar to that described for process knowledge-based decisions and shall reference and be traceable from the waste shipment to the analytical data. All data supporting a determination that a waste is not a radioactive waste shall be documented in a readily retrievable form.

7.0 Shipment of Mixed Waste to a Licensee

In accordance with the policy in DOE Order 5820.2A, radioactive and mixed wastes are to be disposed of at a DOE site. Any exceptions to this requirement must be approved in accordance with the exemption paragraph of the Order.

Two scenarios are possible with respect to shipment of mixed waste. In the first scenario, waste may be shipped for treatment if the receiving facility holds the required RCRA permits and an NRC or Agreement State license for the radionuclides being shipped. In this case, the residue resulting from the treatment must be returned to a DOE site for disposal. In the second scenario, a site may obtain an exemption from Order 5820.2A requirements and ship a mixed waste for treatment and/or disposal at a TSD facility holding the requisite RCRA permit and NRC or state radioactive materials license.

Neither of the above scenarios constitutes unrestricted release of radioactive materials. The radioactivity remains either under the control of DOE or is being managed under the provisions of an NRC or state radioactive materials license.

The site shall have formal procedures, as necessary, to address the two scenarios. A formal policy or procedure must be in place to address the management of radioactivity in mixed wastes sent off site.

Site procedures shall require confirmation that the receiving TSD facility is licensed for the radionuclides being transferred and contain a formal checkpoint at which a qualified and cognizant individual certifies that a radioactive waste is going to a facility with the appropriate radioactive materials license(s). The certification shall be documented. Records traceable to the shipment must be maintained showing that the certification was made and that the waste meets the TSD's acceptance criteria. For example, some TSDs have established radioactivity limits relative to the local background for acceptance of waste.

8.0 Department of Transportation Shipping Requirements

The site shall have formal procedures invoking the DOT-regulations governing shipment of radioactive materials.

9.0 Quality Assurance

The site's formal documented procedures for waste management and characterization (survey, sampling and analysis, and instrument calibration, packaging, storage, and shipping, etc.), shall be covered by approved quality assurance plans meeting the requirements of 10 CFR 830.120, DOE Order 5700.6C and ASME NQA-I, as appropriate. Attachment B. "QA Review Areas," provides general guidelines for evaluating the adequacy of the quality assurance provisions to meet this PO.

10.0 Training

In addressing the requirements of this Performance Objective, Performance Based Training (PBT) must be provided to those personnel performing waste

radioactivity determinations. PBT is training based on an analysis of the job to be performed. The training must cover the procedures that are implemented when deciding and documenting that a waste is or is not radioactive. The training program shall include a method for evaluating the effectiveness of the training (e.g., testing, job performance evaluations). For personnel involved in radiation surveys, training specified in the "Radiological Control Manual," (DOE/EH-0256T, Rev. 1) is adequate for meeting the training requirements of this Performance Objective. [CAUTION: it should be noted that criteria for unrestricted release of material are not addressed in DOE/EH-0256T, Rev. 1. The appropriate criteria are listed in DOE Order 5400.5 and this Performance Objective.] Training records shall be readily retrievable and periodic retraining shall be required.

11.0 Records

All records generated through procedures required by this Performance Objective shall be maintained as quality assurance records until record retention requirements can be incorporated into DOE Order 1324.2A, Records Disposition.

12.0 Review and Approval of Criteria and Procedures

Each DOE contractor shall establish waste certification criteria and procedures covering the release of RCRA-hazardous, state-hazardous and TSCA-regulated wastes generated, stored, or managed by all facilities and projects under their responsibility, including those managed by subcontractors. These criteria and procedures shall be reviewed and approved by cognizant line management. Authority and responsibility for review and approval shall be clearly established and documented and shall be traceable to the relevant criteria and procedures. The DOE Operations Office* shall review the contractor criteria and procedures for acceptance in meeting this Performance Objective.

The contractor line management review and approval, and the DOE field office acceptance, of the criteria and procedures need not occur before transmitting the criteria and procedures to EM for review. However, a commitment for the contractor to approve, and for the DOE field office to accept, the procedures before waste shipments resume will be a condition for lifting the moratorium. After the moratorium is lifted, changes to the waste certification criteria or procedures which affect compliance with this Performance Objective must be similarly reviewed and approved by the contractor, and reviewed and accepted by the DOE field office.

*As used above the term Operations Office includes other field offices that report to Headquarters (e.g., Rocky Flats).

Attachment A

GUIDANCE TO FACILITIES ON CLASSIFICATION
OF RADIOACTIVE MATERIALS MANAGEMENT AREAS (RMMAs)

Background

One of the basic requirements of the EM-30 Performance Objective (PO) for Certification of Non-Radioactive Hazardous Waste is the classification of Radioactive Materials Management Areas (RMMAs) from which all hazardous waste is considered potentially radioactive. A RMMA is defined as:

"an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area that is exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation."

The intent of this definition is to ensure that any area in which hazardous waste could potentially become radioactive is classified as a RMMA; all waste originating, used or stored in a RMMA must be certified through process knowledge, surveying, and/or sampling and analysis that it is not contaminated before it can be released offsite. The PO defined "contaminated" as surface contamination exceeding DOE Order 5400.5 limits, or DOE-added volume contamination that was measurable above background. Hazardous waste originating outside a RMMA can be released offsite based solely on its origin outside a RMMA.

Despite the straightforward definition of a RMMA, our continuing review of facility procedures and discussions with facility personnel indicate that some facilities have experienced difficulty in establishing RMMAs consistent with the PO definition. This is of immediate concern because sites are currently permitted to ship hazardous waste

off-site from areas not classified as RMMAs, even at sites where the moratorium is still in effect and the procedures for establishing RMMAs have not been reviewed and approved. Additionally, at least one facility has been found to have released hazardous waste containing measurable radioactivity offsite, even though the waste originated in areas not classified as RMMAs by the facility. This indicates that RMMAs are not always being established adequately.

To review, hazardous waste used, generated or stored in RMMAs are prohibited from being shipped off-site to TSDs not licensed to handle the radioactivity unless (1) procedures have been approved and the moratorium has been lifted in accordance with the PO, or (2) a specific exemption has been formally requested and has been approved by DOE. Hazardous waste from non-RMMAs is not subject to the moratorium. However, even though formal DOE approval of the site RMMA classifications has not been required to permit shipment of waste from non-RMMAs, sites should review their classification approach to ensure that the classifications are consistent with this guidance. These classifications will be reviewed by DOE during site visits as part of a comprehensive review of the implementation of site procedures for releasing hazardous waste off-site in accordance with the PO.

Guidance

Any area which is known to be radioactively contaminated, is potentially contaminated, or could become contaminated, should be classified as a RMMA unless (1) adequate controls are in place to prevent or detect inadvertent contamination and (2) the potential or existing contamination levels cannot cause detectable levels of radioactivity (above background) in waste generated in the area. Thus, all hazardous waste originating outside a RMMA and remaining outside an RMMA has no potential of becoming contaminated to detectable (above background) levels while it is within the boundaries of a DOE facility. The following guidance clarifies issues surrounding the establishment of RMMAs.

Relationship Between RMMAs and Other Area Designations

DOE Order 5480.11 defines a Controlled Area as “any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials.” To avoid conflict with security designations, related terms such as “Radiologically Controlled Areas” are used at some facilities. A facility may choose to define the boundaries of RMMAs similar to the boundaries of the Controlled Areas because Controlled Areas should encompass all areas where there is a potential for radioactive contamination. However, at some facilities the Controlled Areas encompass a significantly greater area than those areas where there is a potential for contamination. At these facilities, it may be appropriate to establish RMMAs having smaller areas than the surrounding Controlled Areas.

DOE 5480.11 defines a Radiological Area as any area with dose rates exceeding 5 mrem per hour, airborne radioactive concentrations exceeding 10% of tabulated (Table 1) values, or surface contamination levels exceeding tabulated (Attachment 2) values. As now defined by the PO, a RMMA is any area in which a reasonable potential exists for contamination of waste streams exiting the area. Based on this definition and the guidance presented later in this document, it may not be appropriate to define only those areas within Radiological Areas as RMMAs because Radiological Areas are defined based on threshold values. By definition, Radiological Areas encompass Radiation Areas, Airborne Radioactivity Areas and Contamination Areas.

Because the DOE Radiological Control (RadCon) Manual has recently been published, it is appropriate to evaluate the adequacy of the RadCon Manual area definitions for designating RMMAs. The RadCon Manual specifies criteria for posting Radiation, Airborne-Radioactivity, and Contamination Areas, and variants of these areas (e.g., High Radiation Area, Fixed Contamination Area, etc.). In general, the criteria for posting Contamination Areas and Airborne Radioactivity Areas (which are the two areas most relevant to RMMAs) are the same as the criteria established in DOE 5480.11.

An important difference between DOE 5480.11 and the RadCon Manual is the establishment by the RadCon Manual of Radiological Buffer Areas. A Radiological Buffer Area is defined as "an intermediate area established to prevent the spread of radioactive contamination and to protect personnel from radiation exposure. The area surrounds or is contiguous with Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, Radiation Areas or High Radiation Areas." Briefly, Radiological Buffer Areas are to be established within the Controlled Area and are designed to provide a second boundary to minimize the spread of contamination.

Based on the revised definition of RMMAs and the guidance provided elsewhere in this document, subject to certain conditions, an area does not need to be defined as an RMMA if surface contamination levels do not exceed and do not have a reasonable potential to exceed DOE 5400.5 (Figure IV-1) criteria for unrestricted releases of materials¹⁵; and if airborne radioactivity levels do not exceed and do not have a reasonable potential to exceed RadCon Manual (Table 2-4) criteria for posting airborne radioactivity areas. There is a slight conflict between this guidance and the RadCon Manual area designations for Contamination Areas. Specifically:

- The RadCon Manual prescribes a criterion for fixed plus removable surface contamination by transuranic (and other selected) radionuclides that is 5 times higher than the DOE release criterion¹⁶ (500 dpm/100 cm² vs. 100 dpm/100 cm²).
- The RadCon Manual contains a criterion specifically for tritium (10,000 dpm/100 cm²). DOE 5400.5 does not contain a tritium-specific criterion; the relevant criterion

¹⁵ DOE 5400.5 surface contamination criteria are applicable to RMMAs because the criteria pertain to release of materials to uncontrolled areas; RadCon Manual surface contamination criteria pertain only to area designations and release of materials to controlled areas. The RadCon Manual refers to the DOE 5400.5 criteria for releasing materials to uncontrolled areas.

¹⁶ DOE 5400.5 does not specify values for these radionuclides; Based on the March 15, 1984 letter by J. R. Maher titled "Unrestricted Release of Radioactively Contaminated Personal Property," the appropriate values for these radionuclides are the values listed in the Nuclear Regulatory Commission Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors."

is that prescribed for beta-gamma emitters (1000 dpm/100 cm² for removable contamination).

Therefore, the RadCon Manual criteria are somewhat less restrictive in two specific cases than are the DOE 5400.5 criteria (except for those cases described above, the criteria are comparable). This indicates that it would be inappropriate to allow RMMAs to be defined only for those areas designated as Contamination Areas or Airborne Radioactivity Areas, because waste leaving areas not required to be defined as Contamination Areas in accordance with RadCon Manual criteria could be contaminated to surface contamination levels greater than DOE 5400.5 criteria. However, if Radiological Buffer Areas are required to be RMMAs, then this inconsistency becomes less critical because a Radiological Buffer Area is a second boundary designed to minimize the spread of contamination. It follows that Radiological Buffer Areas, if managed properly, are not likely to be contaminated to levels exceeding DOE 5400.5 criteria for surface contamination.

Based on this assessment, RMMAs may be designated to include Radiological Buffer Areas and all associated Contamination Areas, High Contamination Areas and Airborne Radioactivity Areas, subject to the following considerations:

- Radiological Buffer Areas surrounding or contiguous only with Radiation Areas, High Radiation Areas or Very High Radiation Areas need not be considered RMMAs. Similarly, a particle beam of sufficiently low energy as to not be capable of activating waste need not be a RMMA.
- Inactive or secured Contamination Areas that are not designated Radiological Buffer Areas as allowed by the RadCon Manual should be designated RMMAs if there is a potential for contamination of waste generated in these areas, consistent with the PO and this guidance document;

- Designation of RMMAs in accordance with these criteria depends on (1) proper radiological surveys and (2) demonstration and documentation that waste generated in areas with known or potential surface or airborne contamination but not meeting the criteria for designation of RMMAs will not be reasonably expected to become contaminated. This caveat is discussed in more detail on page A-5, Areas that May Contain Incidental Levels of Loose Surface Contamination.

Determination of Contamination or Potential for Contamination

One of the primary difficulties in establishing RMMAs is determining whether a reasonable potential exists for contamination consistent with the PO. In some cases, the potential may exist but be extremely low; in other cases the potential levels of contamination may be extremely low; in still other cases there may be no potential unless there is a breakdown in physical and/or administrative controls. These and other potentially enigmatic situations are discussed below.

Areas Adjacent to Obvious RMMAs

Areas where unencapsulated radioactive materials are used or stored, or where activation may occur due to particle beams, clearly must be designated as RMMAs in accordance with the PO. It is less clear, however, how to designate areas adjacent to these locations. Examples include:

- a room that contains no radioactive materials except for the material contained in a glovebox
- a hallway outside a room that contains unencapsulated radioactive materials
- a room that uses a ventilation system also used by another room that contains unencapsulated radioactive materials

- a large area outside a much smaller area where operations with unencapsulated materials take place, but without obvious boundaries (e.g., walls) to delineate the RMMA.

None of these areas would normally be expected to contain radioactive contamination. However, it could be argued that there is the potential for contamination in each area, e.g., a glovebox that is a RMMA could leak, a person could become contaminated in a room that is a RMMA and contaminate the adjacent hallway after leaving the room, a reverse airflow situation could occur resulting in the introduction of contamination into a room from a ventilation system, or contamination could migrate away from an area where operations with unencapsulated sources take place. Although there is always the potential for these events to occur, there are two keys to whether the adjacent areas should be classified as RMMAs: (1) whether physical and/or administrative controls are established to prevent the areas from becoming contaminated during routine operations, and (2) whether contamination surveys are periodically performed to demonstrate that the controls are effective. If both of these conditions exist, it is not necessary to classify the adjacent areas as RMMAs. If contamination is found during a survey, then the area must be classified as a RMMA until the area has been decontaminated and the cause of the contamination (e.g., a breakdown in a specific physical and/or administrative control) is identified and corrected. If existing controls cannot ensure that contamination of these areas does not occur, classification of the areas must be based on the considerations described in the next section.

Areas that May Contain Incidental Levels of Loose Surface Contamination

Many DOE sites have areas that may contain very low levels of radioactive contamination from site operations, even though the areas do not contain unencapsulated radioactive materials and are not exposed to accelerator beams. In many of these cases physical and administrative controls designed to keep these areas free of contamination are not practicable. Examples include:

- areas adjacent to operations involving tritium, which can become contaminated due to air movement, personnel traffic, etc.
- outdoor areas where radioactive material released from stacks can be deposited under certain meteorological conditions
- areas which are not directly exposed to accelerator beams, but which may become slightly contaminated due to movement and deposition of activated dust particles
- areas which have very low levels of removable surface contamination due to past operations in that particular area or past or current operations in nearby areas, and for which complete and permanent decontamination is impractical.

If surface contamination levels in such areas exceed or have the potential to exceed DOE 5400.5 (Figure IV-1) criteria, or if airborne radioactivity levels exceed or have the potential to exceed the DOE Radiological Control Manual (Table 2-4) criteria for posting Airborne Radioactivity Areas, then the areas must be classified as RMMAs. If the areas may contain surface contamination but only at levels less than these criteria, the approach is not as straightforward. The key issue in this case is whether hazardous materials being used or stored in these areas can become radioactively contaminated. If the levels of removable contamination in the areas are significantly less than DOE 5400.5 limits, it is unlikely that hazardous materials used or stored in the areas would become contaminated to levels exceeding DOE 5400.5 limits for surface contamination. However, it may be possible for the hazardous materials to become contaminated in volume by the transfer of the area surface contamination to the materials. Because the PO criterion for volume contamination is no added radioactivity, then areas where it is possible to have volume contamination of hazardous materials from area surface contamination or from operations in other areas (e.g., from stack releases) would be required to be designated as RMMAs. However, sites can avoid classifying these areas as RMMAs if:

- documented process knowledge can be used to demonstrate that hazardous materials used or stored in these areas cannot become contaminated in volume; or
- documented routine radiological surveys demonstrate that contamination of the areas has not occurred; or
- the site demonstrates and documents via a waste generation study that wastes generated in the area will not become contaminated.

These processes for qualifying waste generation areas as non-RMMAs must be caveated. The status of the areas must be periodically re-qualified because conditions or activities in the areas may change over time.

An important consideration is that conservative yet reasonable scenarios are required to be evaluated for the potential to generate contaminated waste in these areas; unlikely or unreasonable scenarios are not of concern.

Areas that Contain Fixed Surface Contamination Only

Some DOE sites have areas containing fixed contamination but no removable contamination. This situation may have occurred after an area has been decontaminated to the extent possible, leaving only contamination that has become fixed to surfaces and cannot be removed without destructive measures. In some cases these surfaces may have been painted over to ensure that the contamination remains fixed. These areas are not required to be classified as RMMAs provided that sufficient process knowledge and/or physical controls are in place to ensure that the contamination will remain fixed. If it cannot be ensured that the contamination will remain fixed, then for the purposes of the PO it must be considered potentially removable contamination and the contaminated area is subject to the classification requirements described in the previous section.

Widespread Areas that are Contaminated from Past DOE Operations

At some sites there exists widespread radioactive contamination from past DOE operations. Examples include the Nevada Test Site, where much of the site is contaminated at various levels from nuclear weapons tests, and sites having tritium operations (Savannah River, LLNL, etc.), where past releases have resulted in elevated levels of tritium contamination in soil, groundwater, etc. In accordance with the PO, these areas could be considered RMMAs because any hazardous waste originating in these areas could contain radioactive contamination as a result of DOE operations.

It is not the intent of the PO to prohibit the shipment of hazardous waste generated at DOE sites to commercial TSD sites. Rather, the intent is to ensure that any waste that is shipped does not contain radioactivity from DOE operations that is distinguishable from background radiation. The establishment of RMMAs is necessary to determine which wastes need to be evaluated for radioactivity and which do not. For example, because nuclear weapons fallout is omnipresent (albeit at different levels), it would not be reasonable to require entire DOE sites to be classified as RMMAs, because waste containing no radioactive contamination except above ground nuclear weapons fallout would be indistinguishable from waste that never entered the DOE site. However, areas of widespread radioactive contamination from operations at specific DOE sites are a different matter. If hazardous materials/wastes were subject to this contamination, then the radioactivity in the wastes could, depending on the level of effort expended, be distinguished from the radioactivity present in the virgin material.

The key to this dilemma is the level of effort that would be required to demonstrate that the waste contains DOE-added radioactivity. The DOE is not interested in whether hazardous waste can be proven through heroic measures to contain insignificant quantities of DOE-added radioactivity. The DOE is interested in ensuring that hazardous waste shipped to commercial TSD facilities does not contain levels of radioactivity that would likely be detectable using reasonable and readily available

measurement techniques. Therefore, areas of low-level widespread contamination need not be classified as RMMAs if the levels of contamination and operations in these areas are such that any resulting radioactivity in hazardous waste generated or stored in these areas would not be detectable using reasonable and readily available measurement techniques. This determination must be demonstrated, documented, and periodically revisited as discussed in the previous section on areas that may contain incidental levels of loose surface contamination.

Areas that are Prohibited from Containing Hazardous Materials

Some sites have proposed classifying certain areas that would normally be considered RMMAs as non-RMMAs based on the fact that no hazardous materials or wastes will be used or stored in those areas. This approach is not permissible because establishment of RMMAs is the fundamental mechanism to ensure that all hazardous waste that is potentially contaminated is properly evaluated for radioactivity. The decision as to whether hazardous materials are used or stored in an area can be based on whether the area is an RMMA, but should not be used to determine whether the area is a RMMA. Additionally, the PO and the criteria contained therein apply to sanitary waste as well as hazardous waste, although the shipping moratorium does not. Therefore, establishment of RMMAs shall be based on the presence of unencapsulated or unconfined radioactive material or the presence of beams capable of causing activation, not the types of operations permitted in these areas.

Establishment of Temporary RMMAs

Some sites have proposed establishing areas as RMMAs only during certain times, e.g., only when radioactive materials are present in the area or only when an accelerator is being used. This approach would allow hazardous materials to be used in these areas when the possibility of contamination does not exist and not be subject to surveying and/or sampling.

This approach is acceptable for certain areas provided that prior to the area being reclassified as a non-RMMA (see next section), it is ensured that the area is not contaminated. Areas that can be established as temporary RMMAs include areas that are accidentally contaminated (e.g., from a spill) and areas where sources are present infrequently. It is not acceptable to briefly classify as a non-RMMA an area that frequently contains unencapsulated radioactive materials or particle beams to avoid the survey/sampling requirements for hazardous materials used in RMMAs.

As stated previously, this approach is acceptable only when it can be assured that the areas are not contaminated before being reclassified as non-RMMAs. Upon removal of the radioactive source(s) from the area, the area must be decontaminated as necessary and demonstrated by surveys to be uncontaminated before it can be reclassified as a non-RMMA. The survey procedures must be adequate to ensure compliance with the requirements stated in the previous sections on areas with incidental levels of loose surface contamination and areas with fixed surface contamination.

Use of this approach is dependent on the proper management of hazardous waste present in the area when it is classified as a RMMA, i.e., the waste must be demonstrated to be non-radioactive by surveying/sampling or process knowledge according to approved procedures.

These requirements are also relevant to RMMAs being reclassified as non-RMMAs based on the permanent or long-term discontinuation of the use of unencapsulated radioactive materials or the discontinuation of operations involving beams of particles (see next sections).

Declassification of RMMAs

Situations may arise in which areas classified as RMMAs no longer meet the criteria for definition of RMMAs as presented in the PO and this guidance. Such areas may

include, but are not limited to; temporary RMMA as discussed in the previous section; facilities from which source materials have been removed permanently, interminably, or for a prolonged period; and facilities that contain no source materials and have been decontaminated to undetectable levels or levels meeting the unrestricted release criteria contained in DOE Order 5400.5.

Reclassification of these areas as non-RMMAs is permissible provided that the following conditions have been met:

- adequate surveys and analysis have been performed and documented and are sufficient to demonstrate that waste subsequently generated within the areas will not become radioactively contaminated, and
- evidence that the area no longer meets the criteria for definition of an RMMA as presented in the PO and this guidance has been documented.

If the above conditions have been met, sites may reclassify areas without obtaining DOE approval provided, that site procedures for reclassification have been approved as part of the overall site moratorium procedures package or as a separate submittal. If such approval has not been obtained; sites are required to obtain DOE field office approval before reclassifying any existing RMMA as a non-RMMA. This requirement includes facilities that have been decontaminated to levels sufficient for unrestricted release.

Other Considerations

Sites are encouraged to reexamine existing RMMA classifications to ensure that they are consistent with this guidance. Site visits performed to date have indicated that some areas have been inappropriately classified as non-RMMAs. Reclassification of areas as RMMA does not require DOE approval; however, reclassification as

non-RMMAs does require approval unless the conditions described in the previous section have been met.

It is recognized that despite this guidance, situations may exist which are difficult to resolve. In these cases, facilities are encouraged to contact EM-30 for further guidance.

Sites are reminded that although the moratorium does not apply to non-hazardous waste, the maxims of the PO should be applied to all waste generated in a RMMA as it is DOE policy to not release any radioactive waste off-site unless the person or firm receiving the waste is licensed to receive the radioactive component.

Attachment B

QA REVIEW AREAS

In meeting the quality assurance provisions of the EM-30 Performance objective for Certification of Nonradioactive Hazardous Waste, DOE site programs should cover the following:

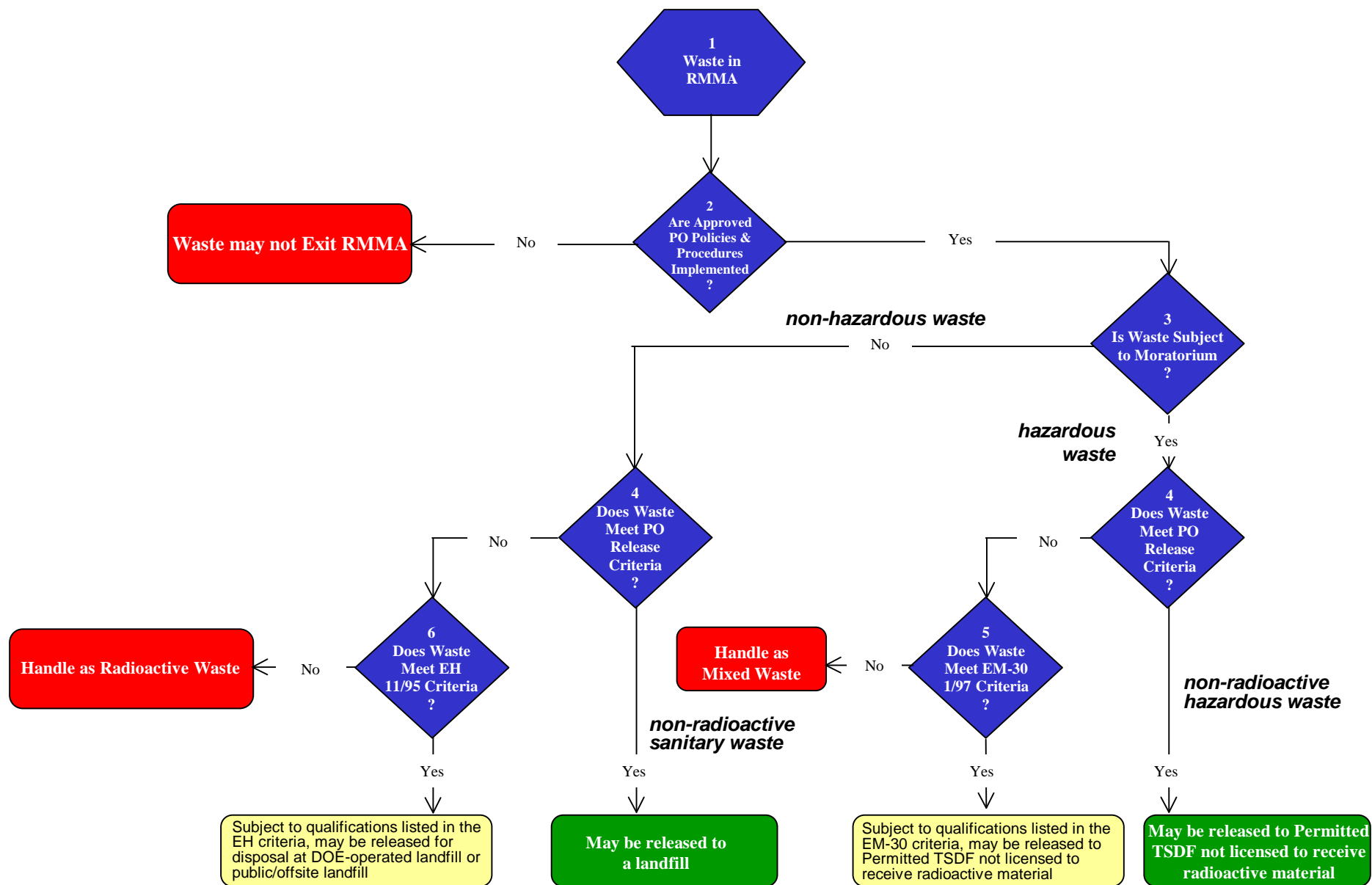
1. An overall QA program or plan per 10 CFR 830.120, DOE Order 5700.6C and/or ASME NQA-I, as appropriate, is applicable to waste management and characterization activities.
2. Detailed procedures are prepared to address the specific items of the EM-30 Performance Objective and the programmatic items of NQA-1 and the facility/activity QA plans.
3. Provisions are established for the training and qualification of personnel performing waste characterization, certification, handling, and management activities.
4. Provisions are established for the control of processes important to waste characterization and data quality (such as sampling, analytical methods, survey etc.).
5. Provisions are established for the control of measuring, test, and analytical equipment used for characterizing the radioactive content of potentially radioactive hazardous waste.

6. Provisions are established for the identification and control of nonconforming conditions related to waste radiological characterization and handling activities and to assure effective corrective action is taken to resolve the nonconformances.
7. Provisions are established for the identification and control of records necessary to document the accomplishment of waste characterization, certification, packaging, and shipping.
8. Provisions are established for the verification that waste management activities are in compliance with the requirements of Federal and state regulations and the facility/activity QA plans.

APPENDIX D

Release of Waste from a Radioactive Materials Management Area (RMMA):

Requirements for establishment of RMMAs and criteria for release of waste from an RMMA are established in the EM Performance Objective (PO) for Certification of Non-Radioactive Hazardous Waste, Rev. 1, EM-30, 2/17/95



Background

The moratorium on offsite of DOE waste originating in radiation control areas was established May 17, 1991, via Memorandum from J. Lytle, EM-30, "Shipment of Waste Originating in Radiation Control Areas." The moratorium and related EM-30 "Performance Objective for Certification of Non-Radioactive Hazardous Waste" (PO), Revision 1, 2/17/95, were established to assure that RCRA-hazardous, state-hazardous, and TSCA-regulated wastes shipped from DOE facilities to commercial treatment, storage, and disposal facilities (TSDF) have NO bulk or volume radioactive contamination added as a result of DOE operations and are in compliance with DOE Order 5400.5 criteria for surface contamination (unless the receiving facility is specifically licensed to manage radioactive waste).

The PO requires that each DOE contractor establish waste certification criteria and procedures covering the release of RCRA-hazardous, state-hazardous, and TSCA-regulated wastes generated, stored, or managed by all facilities and projects under their responsibility, including those managed by subcontractors. These criteria and procedures MUST be reviewed and approved by DOE before the moratorium may be lifted. With approved criteria and procedures in place (PO release criteria), shipment to permitted hazardous waste TSDFs not licensed to handle radioactive material is authorized.

Authority for lifting the moratorium was delegated to the DOE Operations Offices on March 16, 1995, by Memorandum from J. Lytle, "Delegation of Authority for Lifting The Non-Radioactive Hazardous Waste Shipment Moratorium." The March 16, 1995, memorandum transmitted the "Protocol for the Delegation Authority for Lifting the Non-Radioactive Hazardous Waste Shipment Moratorium," approved by EM-331, February 10, 1995.

Key to Logic Diagram

- 1** Definition: A RMMA is defined as:
"an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area that is exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation.

The intent of this definition is to ensure that any area in which hazardous waste could potentially become radioactive is classified as RMMA; all waste originating, used or stored in a RMMA must be certified through this process knowledge, surveying, and/or sampling and analysis that it is not contaminated before it can be released offsite. The PO defines "contaminated" as surface contamination exceeding DOE Order 5400.5 limits and/or measurable DOE-added radioactive volume contamination above background. Hazardous waste originating outside a RMMA can be released offsite based solely on its origin outside a RMMA. The delineation of RMMAs is a complex technical process which is central to the management of waste at DOE facilities where radioactive materials are present. Detailed guidance on the classification of RMMAs is provided in Attachment A of the PO.

- 2** Hazardous waste used, generated, or stored in RMMAs is prohibited from being shipped offsite to treatment, storage and disposal facilities (TSDF) not licensed to handle radioactivity unless:
 - (a) procedures as required by the PO have been approved; and
 - (b) the moratorium has been lifted in accordance with the PO, or
 - (c) a specific exemption has been formally requested and approved by DOE.
- 3** Additionally, the PO and the criteria contained therein apply to non-hazardous waste (sanitary) as well as hazardous waste, although the shipping moratorium does not. (Ref. PO pages A-7 and A-9)
- 4** PO release criteria are:
 - (a) no bulk or volume radioactive contamination added as a result of DOE operations; and
 - (b) in compliance with DOE Order 5400.5 criteria for surface contamination.
- 5** See guidance transmitted via Memorandum, "Establishment and Coordination of Authorized Limits for Release of Hazardous Waste Containing Residual Radioactive Material," M. Frei, Acting Director, EM-30, January 7, 1997. (Note: Guidance based upon reference cited in Key #6 below.)
- 6** See guidance transmitted via Memorandum, "Application of DOE Order 5400.5 requirements for release and control of property containing residual radioactive material," R. Pelletier, Director, EH-41, November 17, 1995.